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Stahl, B. F., 1502 Arch.
Steinbach, L. W., 716 Franklin.
Stelwagon, H. W., 233 S. 17th.
Stern, Max J., 711 Franklin.
Stewart, David D., 2620 N. 5th.
Stewart, John S., 1537 Chestnut.
Stewart, William S., 1801 Arch.
Stewart, W. H., 2436 Germantown Ave.
Stillé, Alfred, 3900 Spruce.
Stocker, A. E., 2212 Fitzwater.
Stone, Edward R., 1539 N. 19th.
Stone, James F., 1806 Green.
Strawbridge, George, 202 S. 15th.
Strittmatter, I. P., 999 N. 6th.
Strobel, John, 948 N. 5th.
Strouse, Fred. M., 2602 N. 12th.
Stubbs, G. Eastmann, 1616 Walnut.
Styer, C., 1740 Columbia Ave.

Taylor, Charles F., 1520 Chestnut.
Taylor, J. Madison, 1504 Pine.
Taylor, William J., 121 S. 18th.
Taylor, William L., 1440 N. 12th.
Teller, William H., Jewish Hospital.
Thomas, Charles H., 1807 Chestnut.
Thomas, F. W., 6 Mt. Airy Ave., Germantown.
Thomas, George P., Jewish Hospital.
Thomson, William, 1426 Walnut.
Toboldt, A. L. A., 822 N. Broad.
Tomlinson, H. A., Friends' Asylum.
Trautmann, B., 242 Franklin.
Trojano, Giovanni, 773 S. 10th.
Troth, Samuel N., 1200 N. 7th.
Tull, M. G., 4807 Woodland Ave.
Tunis, Joseph, 129 S. 18th.
Turnbull, Charles S., 1719 Chestnut.
Turner, John B., 1525 Christian.
Tyson, James, 1506 Spruce.

Updegrove, Silas, 804 Marshall.

Vanderslice, E. S., 127 S. 5th.
Vandyke, Edward B., 306 S. 10th.
Van Harlingen, A., 117 S. 18th.
Vansant, E. LaRue, 1929 Chestnut.
Vogler, George W., 565 N. 5th.

Walk, James W., 737 Corinthian Ave.
Walker, James B., 1617 Green.
Ward, E. Tillson, 843 S. 3d.
Watson, Arthur W., 162 N. 20th.
Watson, Edward W., 131 N. 20th.
Webb, William H., 556 N. 16th.
Welch, William M., 821 N. Broad.
Wells, J. R., 5138 Lancaster Ave.
Wells, P. Frailey, 4023 Brown.

Werner, Marie B., 1010 Clinton.
Wetherill, H. M., 2208 Locust.
Wharton, H. R., 112 S. 18th.
Wheeler, E. B., 1926 N. 8th.
Whelen, Alfred, 123 S. 20th.
White, Frances Emily, 1423 N. 16th.
White, J. William, 1810 S. Rittenhouse Square.
Whiteside, J. E., 6603 Haverford Av.
Wiehle, C. A. Max, 319 N. 32d.
Wightman, J. G., 2030 Wallace.
Wiley, Eugene, 330 Reed.
Willard, DeF., 1818 Chestnut.
Williams, Horace, 1717 Pine.
Willits, Charles H., 24 S. 18th.
Willits, I. P., 5123 Germantown Ave.
Willits, Mary, 1313 Green.
Wilson, H. Augustus, 1611 Spruce.
Wilson, James C., 1437 Walnut.
Wilson, Samuel W., 1010 Race.
Wilson, W. Reynolds, 1633 Locust.
Wirgman, Charles, 2005 Pine.
Wise, George G., 424 S. Broad.
Wittig, Charles F., 480 N. 4th.
Wolff, Lawrence, 333 S. 12th.
Wolfe, Samuel, 1624 Diamond.
Wood, Alfred C., 214 S. 15th.
Wood, Horatio C., 1925 Chestnut.
Woodbury, Frank, 218 S. 16th.
Woods, D. F., 1501 Spruce.
Woods, Matthew, 1307 S. Broad.

Yard, John L., 659 N. 12th.
Yarrow, Thomas J., 1335 N. Broad.
Yeager, Frank N., 2400 Oxford.
Young, I. G., 1000 Shackamaxon.
Young, J. K., 224 S. 16th.

Zentmayer, William, 1714 Girard Av.
Ziegler, George J., 132 Richmond.
Ziegler, S. Lewis, 1528 Arch.
Ziegler, William H., 3028 Frankford Ave.
Ziegler, W. M. L., 1418 N. 17th.
Zuill, W. L., 1526 Race.

DECEASED MEMBERS.

Dr. D. W. Cadwallader,
Dr. E. F. Garrett,
Dr. Samuel R. Knight,
Dr. Harry B. Taylor,
Dr. F. C. Waterman,
Dr. Charles Meigs Wilson.

CONTENTS.

PAGE

Officers and Committees for the Year iii
List of former Presidents iv
List of Members, with their Addresses v
Deceased Members xi

Address of the Retiring President. By W. W. Keen, M.D. . . . 1
Syphilis of the Lung. By William T. Councilman, M.D., of Baltimore, Maryland 4
Treatment of the Upper Air-passages in Phthisis Pulmonalis. By Harrison Allen, M.D. 20
Climatic Treatment of Phthisis. By J. P. Crozer Griffith, M.D. . . 24
The Nervous System in the Treatment of Consumption. By Thomas J. Mays, M.D. 33
The Treatment of Corneal Ulcers by the Actual Cautery. By G. E. de Schweinitz, M.D. 43
Severe Puerperal Eclampsia: Immediate Induction of Labor; Recovery. By William H. Morrison, M.D. 50
The Construction and Adaptation of Spectacle-frames. By Charles Hermon Thomas, M.D. 56
Further Report on a Case of Multiple Sarcomata in a Child. By Frederick A. Packard, M.D. 64
Report of a Case of Fracture of the Body of the Scapula through Muscular Action. By Joseph Leidy, Jr., M.D. 73
Appendicitis. By T. V. Crandall, M.D. 75
Experimental Studies in Intestinal Surgery. By William E. Ashton, M.D., and J. M. Baldy, M.D. 77
Lumbar *versus* Iliac Colotomy. By John B. Deaver. M.D. . . . 97
Traumatic Exophthalmus. By George Friebis, M.D. 107
Nephrorrhaphy for Floating Kidney. By John S. Miller, M.D. . . 110
Arterio-capillary Fibrosis. By Augustus A. Eshner, M.D. . . . 116
Specimens Exhibited:
Tumor of the Colon, Probably Carcinoma. By W. W. Keen, M.D. 123
Microscopic Specimens from a Case of Hairy Tongue. By S. Solis-Cohen, M.D. 123
Fibroid Tumor. By J. M. Baldy, M.D. 124
Excision of the Hip-joint. By DeForest Willard, M.D. . . 124

PAGE
Surgical Cases. By Mordecai Price, M.D. 126
Surgical Scarlatina. By James Hendrie Lloyd, M.D. 132
Abdominal Surgery at the Kensington Hospital for Women. By Charles P. Noble, M.D. 140
Albuminuria of Pregnancy: Two Cases. By Andrew J. Downes, M.D. 158
Some New Points in the Treatment of Tuberculosis. By Lawrence F. Flick, M.D. 161
Specimen Exhibited:
Multiple Fibroid Tumors of the Uterus. By J. M. Baldy, M.D. 172
The Nutritive Value of Beef Preparations. By R. H. Chittenden, Ph.D. 173
Nitrogen-containing Foods and their Relations to Morbid States. By Frank Woodbury, M.D. 181
Atomizer for Spray-producing. Exhibited by James Collins, M.D. . 190
A Further Communication on a New Method of Compressing the Subclavian Artery; with the Report of Two Cases. By W. W. Keen, M.D. 191
Case of Exostosis of Humerus Simulating Axillary Dislocation. By John B. Roberts, M.D. 195
The Relation of Imperfect Surgery to the Sequelæ of Pelvic and Abdominal Operations. By Joseph E. Hoffman, M.D. 196
The Pneumo-therapeutic Institute of Brussels. By Dr. Hovent, of Brussels 209
Abortion at Five Weeks, with Subsequent Examination of the Embryo. By T. Ridgway Barker, M.D. 217
On the Anti-malarial Properties of Pambotano (Calliandra Houstoni). By A. E. Roussel, M.D. 221
Employment of Pilocarpine Muriate in Labyrinthine Disease; with Report of Cases. By S. MacCuen Smith, M.D. 228
Petrolatum. By John Aulde, M.D. 236
How to Use Mydriatics. By Edward Jackson, M.D. 241
An Ophthalmoscope for General Use. By Edward Jackson, M.D. . 246
Sweet Oil in the Treatment of Gall-stones: A Collective Investigation. By Thomas J. Mays, M.D. 249
The Operative Treatment of Appendicitis. By Thomas S. K. Morton, M.D. 261
Report of Cases of Appendicitis. By Joseph Price, M.D. 270
Four Operations for Appendicitis: Three Recoveries, One Death from a Very Small Concealed Abscess. By W. W. Keen, M.D. . . . 281
Obstruction of the Bowel. By M. Price, M.D. 298
Gunshot Wound with Use of the Electric Probe. By A. B. Kirkpatrick, M.D. 308
An Instrument for Making Applications to the Uterine and Urethral Canal. By A. B. Kirkpatrick, M.D. 310
Interesting Cases of Abdominal Tumors. By M. Price, M.D. . . . 312
The Simple Extraction of Cataract. By Edward Jackson, M.D. . . 324
Examination of the Bladder with the Electric-light Cystoscope. By John B. Deaver, M.D. 331
The Medical Treatment of Cystitis. By James Tyson, M.D. . . . 341

PAGE

The Urethra, Bladder, and Ureters during Pregnancy, Labor, and the Puerperium. By W. H. Parish, M.D. 349

The Rationale and Technique of Supra-pubic Cystotomy. By Joseph Hoffman, M.D. 358

Penetrating Wound of the Base of the Brain through the Left Orbit; Hemiplegia; Removal of Clots from the Base of the Brain; Recovery. By Ernest Laplace, M.D. 365

Clinical Contributions to Brain Surgery. By John B. Roberts, M.D. . 369

Modified Junker Inhaler, with Points for Discussion on Ether and Chloroform Narcosis. By Marie B. Werner, M.D. 388

The Medical Treatment of Appendicitis; with Report of Five Cases ending in Recovery. By A. B. Kirkpatrick, M.D. 392

Supra-vaginal Hysterectomy. By J. M. Baldy, M.D. 401

Fractures and Injuries of the Spine in the Cervical Region. By DeForest Willard, M.D. 408

Ophthalmia Neonatorum as a Cause of Blindness. By T. B. Schneideman, M.D. 415

Some Mooted Points Concerning the Vomiting of Pregnancy. By T. Ridgway Barker, M.D. 424

Inversion of a Non-puerperal Uterus. By John B. Roberts, M.D. . 430

APPENDIX:

Hip-joint Disease and its Treatment with some New Lateral Traction Splints. By A. M. Phelps, M.D., of New York City 435

Exhibition of Apparatus:

Portable Beds Used in the Treatment of Hip-joint Disease. By James K. Young, M.D. 453

Beely's Apparatus for the Treatment of Lateral Curvature. By DeForest Willard, M.D. 453

Beely's Scoliometer. By DeForest Willard, M.D. 453

A number of papers also read before the Society during the year are not printed in this volume.

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ADDRESS OF THE RETIRING PRESIDENT.

By W. W. KEEN, M.D.

[Delivered January 21, 1891.]

Ladies and Gentlemen: In laying down the duties and responsibilities of the presidential office, it is a great pleasure to me to be able to extend to you my hearty thanks for the honor of two successive elections, and also for the uniform courtesy and good-will that have been exhibited at all of our meetings.

In addition to this, I am glad to state that the Society is steadily growing in numbers. At the beginning of the last year we numbered 515, and at the first of this year 540, in spite, also, of six deaths. I would again repeat my recommendation of last year, that the members of the Society shall make a vigorous effort to extend our membership. In spite of our apparently large membership, we number only about one-third of the physicians of this county. We ought, at least, to double our numbers, and could easily do so if each member would make an effort to obtain one other.

During the year, we have lost the following honored members by death: Drs. Horace Evans, L. J. C. Kimmell, M. Lampen, R. J. Levis, Philip M. Scheidt, and Henry H. Smith. Although the number is so small, yet it embraces the names of two ex-Presidents of the Society.

During the year, nineteen regular scientific meetings were held, besides the ordinary business meetings. At the nineteen meetings, fifty-one papers and demonstrations were read and made. The number of papers read by invitation of the Board of Directors has been unusually large. Among them have been the following papers by distinguished gentlemen from abroad: On February 26th, Dr. L. S. McMurtry, of Louisville, Ky., read a paper on "The History of Ovariotomy in America"; March 26th, Dr. F. E. Stewart, of Wilmington, Del., read a paper on "The Therapeutic Use of Bullock's

Blood"; on April 9th, Dr. Frederick S. Dennis, of New York, read a remarkable paper, "Containing a Report of 1000 Cases of Compound Fracture"; on April 23d, Dr. Brush reported "A Fatal Case, preceded by Cheyne-Stokes Respiration for Twenty-two Days"; on May 14th, Dr. Cox reported "A Case of Ligation of the Femoral Vein for Traumatism"; on September 24th, Dr. Tunis read a paper on "Fracture of the Ribs from Muscular Action," in which he collected forty-two cases; on October 22d, Dr. Mattison read a paper on "The Penal Status of Opium Habitués"; on November 26th, Dr. Peter McCahey read a paper on "Air Traction in Place of the Obstetrical Forceps"; on December 10th, Dr. Roswell Park gave a lecture on "Peritonitis"; and on January 14th, Dr. Councilman read a paper on "Syphilis of the Lungs."

It will thus be seen that the Society was honored with eleven communications from non-members who were especially invited to appear before the Society, and among them some of the most noted names in American medicine. It would be invidious, perhaps, to specify the papers read by members of the Society, but, on looking over the list, I am very much struck with their value. I must again call attention, however, to the fact that there is a preponderance of surgical cases, and that our members who practise medicine, obstetrics, and the specialties, rather than surgery, are not as active as they ought to be. A gentle hint to them, I hope, will be a stimulus to greater activity in the future.

I desire, also, to call the attention of the members especially to one point. The Committee on Publication, as soon as they receive the manuscript of a paper, put it in type and send out slips to the leading medical journals of the country, and in this way an important paper is not seldom published in several journals simultaneously. Occasionally, members have desired to publish their papers in one especial journal whose editor was a personal friend, and there is scarcely one of our members who is not a personal friend of one of the editors of medical journals in this city. This occasional permission has grown to be such a common practice that of late the authors of papers have taken it for granted and published them elsewhere, even without the permission of the Society. This is a great misfortune, because it has destroyed almost entirely what was one of the particular features of the County Medical Society, namely, the widespread knowledge of the papers read at its meetings and published in so many journals. My earnest advice to the Society is that it pass a resolution that in every instance the papers read at the Society meetings shall be considered

the property of the Society, and can only be published elsewhere with the express consent of the Society, which consent I advise the Society never to give. An inflexible rule will be the only way to keep the intention.

On the 10th of December, 1890, the Society very wisely devoted the evening to the Mutual Aid Society, and, as a result, not only aroused a great deal of interest in its operation, but also added very largely to its funds. It seems to me that it would be a very desirable thing for the Society to devote at least a part of the meeting preceding Christmas in each year to the Mutual Aid Society, and that a special effort should be made to make a handsome Christmas present to the heirs of our brethren who have fallen by the way, and have left their families ill provided for. It would be a very suitable recognition of the claims of the profession upon ourselves. Besides this, if it grew into a stated custom it is very probable that the members would be able to obtain from wealthy patients, and others, additional subscriptions for this purpose, which would swell our meagre funds to ampler and more generous proportions.

At the meeting last December, we were honored by addresses from Dr. Gouverneur M. Smith and Dr. Henry Tuck, ex-President and President of a similar society in New York.

One other matter I venture to bring before the Society, namely, that it should have special meetings two or three times a year for the purpose of taking up one of the important mooted points in the various departments of medicine, and that one or more gentlemen of distinction from abroad, as well as some of our own distinguished members, shall be invited to take part in these discussions. By this means, not only would the important papers and the proceedings of the Society be raised to a much higher level, but they would assume a far greater importance in the eyes of the public, as well as be more valuable to ourselves and the profession at large. I commend this matter especially to my successor in office and the next Board of Directors.

SYPHILIS OF THE LUNG.

By WILLIAM T. COUNCILMAN, M.D.,
OF THE JOHNS HOPKINS HOSPITAL.

[Read January 14, 1891.]

It would not be within the scope of this paper to give anything but the merest outline of the literature on this subject. Although much had been written on this subject in the preceding century and many cases of *phthisis e lue venerea* reported, the first anatomical description of the disease was given by Depaul, in 1853, in a paper before the Paris Academy, on "A Manifestation of Congenital Syphilis consisting in an Alteration of the Lungs not yet described." Wagner, in his work on *Syphiloma*, gave a much fuller description of the lesions, particularly the congenital form in infants. Virchow expresses himself very guardedly about the disease, and is inclined to be sceptical about most of the cases which have been previously reported. He recognizes certain lesions of the lungs as most probably syphilitic in character, particularly if they are found with other manifestations of syphilis. The most marked of these are a fibrous interstitial pneumonia along the bronchi, leading to the formation of fibrous bands which pass from the centre of the lung toward the periphery along the bronchi and vessels, and which by their contraction produce marked deformity of the lung. Along with this there is frequently a pleurisy leading to the formation of fibrous nodules beneath the pleura. There may also be caseous pneumonia and gummata. He says that cavities may form from the softening of the foci of caseous pneumonia, and then comes the question of syphilitic phthisis. The gummata are with difficulty to be distinguished from other caseous foci in the lungs. The description of Virchow has formed the basis of all the following descriptions of the disease, and nowhere is there given a careful description of the finer details of the lesions. Virchow was the first to describe the white pneumonia of children, and Hecker showed its association with syphilis. This condition of the

lung described by Virchow was afterward described by Lorain and Robin under the name of epithelioma of the lung, this name being given because the alveoli were closely packed with desquamated fatty epithelial cells. The most of the literature is taken up with accounts of cases, and most of these would now be recognized from the description of the lesions, not as cases of syphilis of the lungs, but as cases of tuberculous phthisis. The idea of a syphilitic phthisis seems to have become deeply rooted in the minds of many clinicians. This idea was largely due to the general acceptance of the views of Virchow as to the non-tubercular character of most of the lesions of phthisis. The most of the cases reported come in the time of the most general acceptance of this belief, from the beginning of 1860 to 1875. Then they become less frequent, and since Koch's publication and the general recognition of tuberculosis as the cause of phthisis, there have been few publications on the subject. The most complete monographs on the disease, with careful reviews of the literature, are by Carlier in 1882 and Hiller in 1884. Carlier collected 75 cases, chiefly from English and French sources, and in 50 of these the report of the autopsy was given. Hiller reports 87 cases, 84 of these with autopsies, and gives a careful *résumé* of the description of the lesions in these cases. Carlier had already reported 20 of the cases of Hiller. Hiller himself reports 2 undoubted cases in which, along with evidences of syphilis, the characteristic lesions were found in the lungs. Hiller denies *in toto* the existence of a syphilitic phthisis, and thinks the cavities in the cases which are to be regarded as syphilitic were bronchiectases, and, from the description of these cavities, it is almost certain he was right. The cases he regards as doubtful should certainly be regarded as cases of tuberculous phthisis, generally of the fibroid variety. Of the 84 cases of Hiller's with reports of autopsies, only 28 should be regarded as syphilitic. The most remarkable article on the subject is that of Pancritius (Berlin, 1881), in which he speaks of syphilitic phthisis as one of the most frequent diseases—one that decimates the flower of the land. Most of the cases he reports are clinical, and consist of rather vague pulmonary lesions, with frequently equally obscure general manifestations of syphilis, which were cured by the use of iodide of potassium. From what can be made of the reports of autopsies which he gives, it would seem that most of the cases were tuberculous. The idea seems also to be held that even a tuberculosis of the lungs could have a peculiar character given it by the presence of syphilis in the individual. Henop gives a very good report of a case,

with a description of the anatomical changes and a plate. In his case there were numerous gummata in both lungs from the size of a nut to that of a goose-egg, without any breaking-down of tissue.

I have gone over most of the literature of lung syphilis, and excluding the congenital syphilis of the lungs in infants and the doubtful cases of adults, the disease seems to be a comparatively rare one. It is difficult to see why syphilis of the lungs should be such a rare disease. That the lungs are so frequently the seat of tuberculosis we can understand from the ease with which the tubercle bacilli can enter them. Of course, the syphilitic virus would not be apt to enter the lungs from the bronchi except in cases of syphilitic ulcerative bronchitis, and one would suppose that they should be equally exposed to the action of the virus as other organs—the liver for example. In the last two years two cases of syphilis of the lungs have died at the hospital. Both of them were typical cases, and one of them in the extent and the acuteness of the lesions offered the most favorable opportunity for the study of the process. In this case there is an entire absence of clinical history.

The man, J. F., came to the dispensary of the Johns Hopkins Hospital on the 20th of last June. He left the cars a few steps from the dispensary door. He walked with difficulty to the dispensary, holding himself up by the iron railings, entered the building and immediately fell to the floor. His face was intensely cyanotic, he gasped for breath, and died in a few minutes. All that could be learned from his friends was that he had been suffering for some time from Bright's disease, and that morning feeling particulary unwell he had determined to apply to the dispensary for relief.

The autopsy was made two hours after death. The body was that of a large, well-nourished man. There were cicatrices and coppery discolorations over the tibiæ, the inguinal glands on both sides were enlarged and indurated, and on the glans penis there was a well-marked cicatrix with a loss of substance of the glans. The cause of death was found to be an acute endocarditis with rupture of the chordæ tendineæ of the mitral valve. There were several distinct ulcerations on the edge of the mitral valve; the chordæ tendineæ of the left flap of the valve were ruptured. The ruptured chordæ and several others were thickened, they had an opaque white color, and were covered with small fibrinous masses. The whole heart was greatly hypertrophied and weighed 730 grms. All of the arteries were thickened. This was most marked in those of small calibre. The aorta was thickened, covered with numerous opaque whitish-yellow patches, and the thoracic portion was generally dilated.

Both the spleen and liver were much enlarged and hyperæmic. The kidneys were very large, both together weighed 700 grms. The surface was slightly mottled, the capsules in most places firmly adherent, the surface sprinkled with minute intensely red points, and around these there were slight opacities. Here and there were larger and more diffuse hyperæmic

portions. On section the cortex was thicker than normal, it was moist; the striation was obscure, and there were red points and streaks both in the cortex and pyramids.

In the œsophagus, 7 cm. from the pharynx, there were two superficial ulcers.

In each pleural cavity there were about 200 c. c. of clear, slightly blood-stained fluid; both lungs were adherent by a few old fibrous adhesions. The condition of the lungs was most interesting. The right lung was voluminous and did not collapse on removal from the chest. There was an œdema of the entire lung, which was most marked in the lower lobe. The anterior edge and the apex were somewhat emphysematous.

The pleural surfaces were smooth, save for the old fibrous adhesions. Many small tolerably firm nodules could be felt beneath the pleura, along the posterior border of the lower lobe. On section of the lung there were numerous areas of consolidation in the posterior portion of the lower lobe. These areas in some cases were more or less connected with each other. The solid portions on section were of a grayish-red color, the cut surface perfectly smooth and dry; only a little slightly blood-stained fluid could be squeezed from them. In the centres of some of these areas there were white, opaque, irregular caseous masses, with sharp, clear-cut margins. They projected slightly above the surface, were firmly adherent, and with some difficulty could be broken away, leaving a smooth cavity. The caseous material so broken out was very firm, it could not be crushed beneath the fingers nor broken up easily with needles. The lung-tissue between and around these solid areas was intensely œdematous, but after the œdematous fluid was squeezed out the tissue was firmer and more voluminous than normal. The portion of lung so affected comprised about one-third of the lower lobe.

The left lung was voluminous and œdematous. Emphysematous in the upper lobe and along the anterior edge of the entire lung. Along the anterior edge of the upper lobe irregular contractions, and below these small stellate cicatrices. In the lower lobe just below the root of the lung was a small induration similar to those in the right lung, and in the centre of this a caseous focus.

The microscopic examination of the kidneys made fresh, and after hardening in Müller's fluid, in alcohol, and in Fleming's fluid, showed numerous alterations. In the fresh sections there was marked fatty degeneration of the epithelium of the convoluted tubules and the smaller collecting tubules. Sections made after hardening in the various reagents mentioned showed marked changes in the glomeruli. The capillary vessels in these were thickened, the thickening being due to the formation of hyaline, some of them were obliterated; portions of the glomeruli, and where the alterations were more profound, the entire structure, were changed into masses of hyaline. Along with this there was a marked proliferation of the capsular epithelium, and in some cases there seemed to be a growth of connective tissue from the capsule into the so-altered glomeruli. The tubes were dilated, filled with granulated detritus, cast-off epethelial cells, and albumin. There was hemorrhage here and there into the capsular space of the glomeruli and into the tubules. There was a general œdema of the kidney and a

diffuse formation of connective and granulation connective tissue chiefly around the glomeruli. All of the arteries were thickened. The liver showed atrophy of the liver-cells, a marked hyaline thickening of the capillaries, with dilatation of the lumen. The lesions in the heart were not those of an ordinary endocarditis. Sections of the broken and swollen chordæ tendineæ showed in all of them a necrotic process, with formation of hyaline.

The microscopic examination of the lungs gave the most interesting results. In these the principal lesions were foci of interstitial pneumonia, with central necrotic caseous masses, the foci being separated from one another by a tolerably firm though œdematous lung-tissue. We will describe the central caseation, the surrounding interstitial pneumonia, and the intermediate tissue.

Sections were examined after hardening in Müller's fluid and in alcohol. The Müller's fluid specimens were stained in hæmatoxylin and eosin. Examined with a low power, the most striking thing about the caseous areas in most cases was the very sharp limitation of the necrotic process. The necrotic area stained brightly with eosin, and there was an entire absence of nuclei stained with hæmatoxylin. This was particularly marked in the larger and more definite areas. The smaller necrotic foci, though in most cases sharply limited, yet in places seemed to pass into the surrounding tissue, and along the edge there were numerous polynuclear leucocytes which had wandered into the caseous mass. Even with a low power the structure of the lung could be recognized in the caseous tissue. The walls of the alveoli could be made out, they were thickened, and stained more brightly than the contents. In them were irregular masses which with a high power could be recognized as fibrin and large necrotic cells. In many places the alveolar walls were changed into smooth hyaline-looking masses which stained brightly with eosin. The tissue around the larger necroses was a tolerably firm connective tissue, rich in spindle-cells. In most cases this entirely obliterated the lung-tissue. Here and there the walls of the alveoli could be recognized, and here and there, mixed with the fibrous tissue were masses of fibrin. The walls of the alveoli were thickened, and in most cases the connective tissue masses seemed to result from this. In other cases there seemed to be a growth of fibrous tissue directly into the alveoli. Around the smaller necroses the fibrinous exudation, with thickened alveolar walls, was the more characteristic feature, and here the whole tissue seemed to become necrotic, the central necrosis enlarging by the advance of the process.

In other cases the induration was not so marked. In place of firm connective tissue there was a loose œdematous tissue which contained very few cells. In this the alveoli could be recognized as small, irregular spaces scattered here and there through the tissue and lined with cuboidal epithelial cells. Most of these were filled with desquamated epithelium similar to that lining the walls. The condition of the lung outside of the connective tissue, in the portions which macroscopically had an œdematous appearance, proved of most interest because here the process was more acute. Even the first glance at this tissue showed a decided atrophy of the walls of the alveoli. The alveoli were distended and filled with large, swollen, pale epithelial cells and fibrin. In some places there were small foci of

hemorrhage. Along with these large epithelial cells and fibrin there were small, smooth hyaline masses which varied in size from that of one-half the diameter of a red blood-corpuscle up to that of one of the large epithelial cells. They stained clearly with eosin, and were best marked in the Müller's fluid specimens. Closer examination showed that they resulted from a hyaline degeneration of the epithelial cells. Many of these cells showed various stages leading to complete hyaline degeneration. The most of the hyaline was formed at one point at the periphery of the cell, and in some cases these hyaline masses projected in a polypoid manner from the cell. Other cells had undergone a complete hyaline metamorphosis. The atrophy of the alveolar walls was everywhere marked, but in some places more extensive than others. In the most advanced places no structure of the wall could be recognized, it was changed into a thin, smooth mass of tissue, with but few nuclei scattered along it. In the less advanced cases the capillaries were in great part obliterated. The obliteration of the capillaries was due to a hyaline degeneration of their walls. They were for the most part converted into rigid tubes which remained open on the sections, and many of them were so narrowed that the lumen would not admit the passage of a red blood-corpuscle. The hyaline material in their walls stained slightly with eosin. It was more refractive than the ordinary connective tissue, and was best seen in the sections of the alcohol-hardened tissues, which were stained with picro-carmine and mounted in glycerin. In such specimens it was stained a bright yellow color. Here and there the lumen of the vessels was entirely obliterated and they could be followed as rigid hyaline tubes for some distance. Many of the small veins and arteries also contained this hyaline material in their walls, or were entirely obliterated by it. In the immediate neighborhood of the arteries and bronchi there was more formation of connective tissue: the alveolar walls here were thickened and contained numerous small, round cells. In many cases there seemed to be a growth of connective tissue from the bronchi and arteries into the atrophic lung following along the walls of the aveoli. The lung adjoining the areas of loose œdematous connective tissue showed the same alterations. Here the loose connective tissue seemed to proceed directly from the alveolar walls. In this portion of the lung the alveoli seemed rarely to be entirely destroyed, and could be recognized in the small clumps of pale granular epithelial cells distributed everywhere through the œdematous tissue. All of the bronchi in the affected portions of the lung were altered. The most characteristic lesion in them was a decided narrowing of the calibre, the walls otherwise preserving their integrity. The narrowing was due to a growth of connective tissue into the lumen, pushing the epithelium before it. In some cases this took place from all sides, in others there was a polypoid mass of tissue projecting into it from one side and entirely occluding the lumen. In most cases the epithelium was perfectly preserved. In others it had fallen off and lay within the lumen. There was almost an entire absence of leucocytes in the tissue. Only at the edges of the most recent gummata and in a few of the alveoli were any found.

In all the portions of the lung affected there was an endarteritis of the small arteries. In some cases this led to complete occlusion of their lumen.

In some of the smallest arteries there was the same hyaline degeneration that was seen in the capillaries and small veins. Sections made through the large bronchus and bloodvessels to the lower lobe showed thickening of the perivascular tissue, with a marked small cell-infiltration of the bronchial mucous glands. There was also a slight endarteritis of the pulmonary artery. The bronchial arteries were not affected.

The other case showed lesions which were less extensive and much more advanced than in the first case. They were further obscured by an acute inflammatory process which did not seem to have any connection with the syphilitic changes. The clinical history of the case is as follows:

M. T., white, female, married, aged forty-three years. Entered hospital October 6th complaining of shortness of breath and œdema of lower extremities. The patient had usually enjoyed good health. Had acute rheumatism several times, the first attack eight years ago, and since then several other attacks, the knees being principally affected. Noticed shortness of breath for the last two years. Of late this has increased. Has a good deal of cough. Swelling in legs began in July and increased very much in the two weeks before admission into hospital. On physical examination there was slight dulness in the posterior portions of the lungs and numerous liquid râles at both bases posteriorly. On the face and right infra-clavicular region several nodules of ecthyma. On the 13th patient had a chill. Examination of urine showed a large amount of albumin and numerous casts. Patient died October 24th.

At the autopsy there was found a chronic nephritis, heart hypertrophy, and a syphilitic liver. Microscopic examination showed amyloid infiltration of the lower spleen and kidneys. The widespread amyloid degeneration, with the characteristic lesions of the liver, small gummata, and bands of fibrous tissue, leave no doubt as to the correctness of the diagnosis of syphilis.

Both lungs adherent to pleuræ along the posterior portions. Pleural cavities dry. The anterior edges of lungs in high degree emphysematous.

The surface of the right lung was very irregular. It was divided into large projecting masses with deep depressions between them. At the bottom of these depressions the pleura was thickened, and there were masses of connective tissue running from the thickened pleura toward the centre of the lung. Some projecting masses of lung were almost cut off from their connection and were very emphysematous. The alveoli in these portions were plainly visible to the eye, and on pressure the lung substance was very atrophic. All of the projecting masses of lung were emphysematous, some more than others. On section of the lung there were dense masses of connective tissue along the bronchi and great vessels. These bands were most dense at the hilum of the lung and radiated from here to the pleura. They were connected with the thickened pleura at the depressions. This tissue was hard and tough, was almost devoid of air, and of a grayish, slaty color. The large bronchi were slightly dilated. In this thickened tissue there were several caseous nodules surrounded by firm capsules of trans-

parent connective tissue. In addition to the consolidation due to this connective tissue, there was a mottled-red consolidation of the upper half of both lower and upper lobes.

The left lung showed about the same lesions as the right. More than one-half of the entire lung was consolidated, both from an interstitial process proceeding along the bronchi and a mottled-red consolidation accompanying this. There were several small, hard nodules beneath the pleura. These were surrounded by zones of fibrous tissue from which bands of fibrous tissue were given off, which penetrated the lung for some distance but were not connected with the fibrous tissue along the bronchi. Pus could be squeezed from all the bronchi in the consolidated lung. Microscopic examination of the fibrous tissue along the bronchi showed a rather loose connective tissue containing few cells. In this there were collections of small epithelial cells and some irregular spaces lined with cuboidal epithelium. These evidently represented the remains of alveoli. From these masses of connective tissue bands were given off which ran through the neighboring lung-tissue between the lobules. The bronchi in all this tissue were affected. Most of them showed the same growth of fibrous tissue into the lumen as the other case. Some were entirely obliterated, their place being marked by the remains of the muscular tissue. The lung adjoining these fibrous portions was in a state of acute inflammation. The alveoli were filled with fibrin and leucocytes. The walls of the alveoli were thickened and infiltrated with cells. All of the bronchi were filled with mucus, pus-cells, and desquamated epithelium. Nearly all of the lung not occupied by the fibrous tissue was in high degree emphysematous, the alveoli greatly dilated, and the septa destroyed. The arteries in the fibrous tissue, and in other portions of the lung showed an endarteritis, the lumen often reduced to one-quarter the original diameter, and in some cases a second muscular coat was formed inside the original. The caseous nodules in the indurated portions were typical gummata, and in most of the necrotic material there was complete hyaline degeneration. The nodules beneath the pleura showed a hyaline necrotic centre surrounded by denses masses of connective tissue, with bands radiating from this into the lung.

In this case there was marked destruction of lung-tissue. This was caused not only by the direct substitution of the connective tissue, but by its further contraction compressing portions of the lung and giving rise to emphysema of the adjoining portions. To this condition the dyspnœa, from which the patient had been suffering for the two years preceding her death, was due. The chill and the marked increase in the dyspnœa at the last were due to the addition of an acute broncho-pneumonia. In this case all of the changes seemed to have reached their full development. There seemed to be no extension of the gummata nor of the interstitial pneumonia, and the early steps of the process and the advance of the lesions so well seen in the other case were absent.

In the study of the cases the first idea was to attribute all the

lesions to the obliterating endarteritis. The formation of interstitial tissue is often seen to be dependent on this. The endarteritis in the first case was most marked; it was acute and seemed to be the same process which led to the narrowing and occlusion of the bronchi and the alveoli.

We believe that for every inflammation, for every interstitial process in an organ there must be a preceding destruction of tissue. This idea of a primary lesion of tissue, which was first advanced by Weigert, can be demonstrated in many instances, and seems to be too general a pathological law to admit of exceptions. In the first case the very beginning of the lesions could be made out in the atrophy of the alveolar walls. It does not seem at all probable that this was due to the endarteritis, for this was most marked in the most altered portions of the lung, and was generally absent where the atrophy of the alveoli was most marked and the process, as shown by the fibrinous exudation, was most acute—that is, in the tissue outside of and between the interstitial portions. Further, the lesion was too widespread to be the result of an endarteritis, unless of the branch of the pulmonary artery supplying this portion of the lung. There was a slight endarteritis in this, but it was not more than would be accounted for by the destruction of the capillary territory in the portion of the lung involved. The character of the endarteritis would rather lead us to regard it as secondary. There seemed to be no lesion of the muscular coat which might account for it, but the arteries were narrowed by an even formation of connective tissue all around the intima.

The atrophy of the alveolar walls was connected with the most acute changes, with the fibrinous exudation, and with the proliferation of the epithelium, and, as far as could be seen, the hyaline degeneration of the capillaries was the first step in this atrophy. It would be a point of great importance to ascertain whether this lesion in the lungs was caused by the direct action of the syphilitic organism or by some soluble substance produced by the organism and affecting the tissues, somewhat in the manner that the diphtheritic virus acts. The focal character of the lesions in the lungs would lead us rather to regard them as due to the direct action of the organism on the tissues, but very similar lesions were found in the other organs, particularly the kidneys, and here the extent and the diffuseness of the process would lead us rather to regard the lesions as due to a soluble virus. Our total lack of knowledge as to the character of the syphilitic organisms makes this mere speculation,

but all of the lesions can be best explained by the assumption of a soluble substance which, having been produced by an organism, enters the circulation and exerts a special action on certain tissues of the body, namely, on the capillary walls. The more careful search of the lungs in both these cases failed to show the presence of any organisms.

It is interesting to find that the essential process in the production of gummata in the lung is a pneumonia with fibrinous exudation, accompanied by fibrous thickening of the alveolar walls, the whole undergoing caseation. It would seem that the gummata were produced where the action of the virus was most intense. Necrosis of the tissue takes place before there is time given for the development of connective tissue. The large gummata which were surrounded by the connective tissue had sharp edges, and there seemed to be no advance of the necrosis. The smaller ones, which were surrounded by the acutely-altered lung with exudation in the alveoli, were increasing by an extension of the necrosis. Where the action of the virus was less intense there was time given for the development of connective tissue, which in some instances seemed to grow into the altered lung from the fibrous tissue around the arteries and bronchi. In other instances the connective tissue apparently developed from the walls of the alveoli.

The close analogy between tuberculosis and syphilis of the lung is shown by the formation of the gumma being essentially a caseous pneumonia. The chief lesions in the tuberculous lung are the results of a caseous pneumonia, but there is wide difference in the nature of the processes. The tuberculous caseous pneumonia is the direct action of the tubercle bacilli on the tissue. The exudation is almost entirely cellular, and the result is a mass of dead cells which can undergo no further change except a liquefaction of the cells themselves or the substance between them, as the result of either the further action of the tubercle bacilli or other organisms which have entered the tissue. In the gumma the primary process is the atrophy of the alveolar walls, due most probably, to a hyaline degeneration of the capillaries. The whole thing, the epithelial cells within the alveoli, the vessels and the alveolar walls, all gradually undergo the hyaline metamorphosis and become changed into a dense solid mass of hyaline. This hyaline seems to be one of the most resistant substances, and when once formed shows no more tendency to undergo further change than does the closely-related amyloid substance. Is there a syphilitic phthisis? We think not. In the syphilis of the lung there is only the production of connective tissue and the

dense hyaline gummata. There is an entire absence of the ulcerative processes which we find in tuberculosis. Instead of a caseous bronchitis, with destruction of their walls, there is the same process of connective-tissue formation in the bronchi leading to their obliteration that we find in the alveoli. There may be bronchiectases produced by effects of the contraction of the fibrous tissue which has formed around the neighboring bronchi. In some of the other cases reported there were cavities described with perfectly smooth walls, which were almost certainly bronchiectases. One cannot make much of the cases reported. Most of them were published before the discovery of Koch, when our means for diagnosticating tuberculosis were not so accurate as they are now, though even then a close study of the syphilitic and tuberculous processes should have been sufficient for diagnosis, but such close study does not seem to have been made. Even after the discovery of Koch, and the great extension of our knowledge of tuberculosis which this occasioned, a case was recently reported by Potain of mixed syphilis and tuberculosis. The patient had constitutional syphilis. There were large ulcerated cavities in both lungs. In the base of one lung was what the author described as a syphilitic pneumonia. There was a dry caseous consolidation. Tubercle bacilli were found in the cavities, and, strange to say, they were also found in the caseous pneumonia at the base. The author regarded this as an attack of the tubercle bacilli on the syphilitic product.

In both of our cases sections were stained and examined for tubercle bacilli, but in neither case were any found. The point which has come out in this investigation, and which we consider of importance, is the hyaline degeneration of the capillaries. It would not do to generalize and claim this as a special effect of the syphilitic virus in all syphilitic lesions. In the lung it certainly seemed to be the primary lesion. The mode of formation of the gummata by a pneumonia, with a termination in necrosis, is also interesting, because in this way most of the tuberculous lesions in the lungs are formed. The hyaline degeneration of the capillaries, of the cells in the exudation, and of the necrotic masses, would seem to be a special feature in syphilis. Another feature which was most prominent was the absence of leucocytes in the exudation, although all the conditions which they usually accompany seemed to be present. In the first case, on which most of our conclusions were based, they were almost absent in the lesions in all the tissues. It is probable that the hyaline and thickened vessels offered a greater impediment to their exit.

DISCUSSION.

THE PRESIDENT: The members of the Society are to be congratulated upon the opportunity of hearing this paper, which will undoubtedly prove to be a classic in connection with syphilis of the lungs. Most of the papers heretofore written on this subject have been of a general, vague character, the cases presenting more or less the signs of ordinary phthisis, together with the signs of general syphilis; but there has not been made, as far as I know, any such exhaustive study of the pathological changes as has been made in the two cases reported to-night. This is another illustration of how valuable a thorough examination of one, two, or three cases can be made. I commend the paper especially to the younger members in this respect as an example to them of the far greater value such careful examination of a small number of cases may be, as compared with the less careful examination of a much larger number.

In suspected syphilitic trouble of the lungs the sputa should be examined for the tubercle bacilli. A case of that kind is under my care at present. A young man, in conseqence of a dissipated life, broke down a splendid constitution, acquired syphilis, and recently came to me stating that he had been unwell for a week. To my astonishment I found signs of extensive disease in the right lung. There was almost no cough, and it was at least a week before I could obtain a sputum for examination. This was submitted to Dr. Coplin, pathologist at the Jefferson Hospital, who determined the presence of tubercle bacilli. This at once threw out entirely any suspicion of syphilitic lesion of the lung, which was, of course, one of the possibilities first suggested to my mind.

DR. J. P. CROZER GRIFFITH: I have never seen a case of syphilis of the lung, either post-mortem or ante-mortem, where I was sure I had that disease under observation. The literature of this disease is in great confusion, and it is impossible to find out the exact character of the lesion produced in the lung by syphilis. Whether there can be pulmonary syphilis, and, if so, what shape it takes; whether cavities can form, under what conditions gummata can develop, are unknown. I am, therefore, glad to have heard the paper to-night. Dr. Councilman has discussed the pathological side of the matter so fully that there is little left to say upon it. There are, however, some remarks from a clinical standpoint which may be of interest, especially with reference to the question whether there can be a *syphilitic phthisis* or not. There are a number of authorities who are much disposed to call every case of phthisis one of syphilitic disease of the lungs, provided they can determine that at any time in the life of the individual syphilis existed. In the light of the great prevalence of the two diseases such a view should not be readily accepted. It is quite certain that syphilis, just as rickets, or locomotor ataxia, or diabetes, may precede tuberculosis as a predisposing cause, although not a direct cause of the disease. I think that is about as far as we can go at present. Dr. de Schweinitz reported in *The Medical News* some years ago a case of general tuberculosis developing in a child the subject of inherited syphilis. He simply reports

it as a case which might have been considered as one of syphilitic disease, had not the autopsy shown it to be tubercular. There are certainly some cases published which would indicate that it is possible to have syphilitic disease in the lungs with softening, as has been claimed by a number of observers. Eichorts has reported one case without autopsy, A man developed what was supposed to be tubercular phthisis with signs of softening. He was sent to a health-resort, but did not improve. He presently developed nodes, and he was then put upon vigorous anti-syphilitic treatment with inunctions of mercury. The nodes disappeared, and his lung disease entirely passed away, and he made a perfect recovery. Another German observer reports a case of a man, sent away in the same manner on account of apical phthisis, who had had repeated attacks of hæmoptysis, and who was subsequently put under anti-syphilitic treatment and recovered promptly and fully. A number of other cases of this nature have been reported, but most of them are worthless. These also may be worthless, but they are reported by good observers, so then the possibility of the existence of a syphilitic phthisis must at least be kept in mind. In regard to the liability to mistakes in diagnosis I have in mind three cases, two at least of which certainly had not syphilitic phthisis. One case was reported by the late Dr. Bruen. I did not see the patient, but I have examined the specimen microscopically, and it is true that the sections of lung present a different appearance from those of ordinary phthisis, or any form of pneumonia. There is a large amount of fibrous tissue, and also some peculiar nodular depositions which may have been gummatous. I have, however, found abundant tubercle bacilli. I think we are not justified, under such circumstances, in concluding that we have had an implantation of tubercle bacilli on a syphilitic lung. The second case was a man now living. In January he acquired syphilis, and he had no hereditary disposition to tuberculosis. About June he commenced to cough, and he has had cough and slight expectoration of blood. He has some alteration of the top of one lung, perhaps both. He has been said by a high authority to have syphilis of the lung. Wishing to settle the matter beyond question, I examined the sputum a few days ago, and found numerous bacilli. As the President has remarked, the examination of the sputum will often settle the diagnosis at once. The third case was sent to me by a laryngologist. The patient had a distinct history of syphilis, and was supposed to have syphilitic laryngitis. He ran down in health, and had cough, and the question was whether there was involvement of the lungs. There was, it is true, some affection of the lungs. I found slight changes which I had every reason to believe to be tubercular; though it was learnt that they were syphilitic. I have not seen the man since, and have not had an opportunity of examining the sputum. These cases illustrate the importance of microscopic examination of the sputum in all doubtful instances.

DR. HENRY F. FORMAD: Looking over my notes of cases of syphilis, I have found some thirty odd cases, which, by the clinical history, had had syphilis. Of this number I pick out ten in which the post-mortem shows general syphilitic lesions, and have examined the notes to see the conditions of the lungs. An analysis of these cases shows that in three there was syphilis of the mouth, in five of the epiglottis, and in six the vocal cords

were distinctly affected. In four there was pronounced consumption, and there were distinct tubercle bacilli. I know nothing of the clinical aspect of these cases. There were tubercle bacilli in the lung side by side with a distinct history, and syphilitic lesions in other parts of the body. I do not depend upon the condition of the lungs, but on the general aspect of the organs, and upon one sign connected with the bloodvessels, to which I shall again call attention. This condition is found in syphilis of other organs besides the lungs. I think in this affection there is distinct peri-arteritis in all the bloodvessels; I should lay considerable stress upon this change in the arteries. In the cases I have noted, the disease was more marked at the bases of the lungs than at the apices. In one case there was distinct fibroid induration with caseation and gummata in the pleura at the base of the lower and middle lobe of the right lung. This has struck me in other cases in which I have not kept exact record. Gummatous formation was at the periphery of the lung, not at all toward the trunk, and appeared to be more like an affection which had worked its way inward. The fibroid change was a very large feature in all the cases. Whether or not this is in any way peculiar to syphilis I do not know; I think that it is. Under the microscope there is a distinct thickening of everything. The bronchioles are thickened, and the bloodvessels—not only the arteries, but also the veins—are thickened. There is a distinct endarteritis with a remarkable proliferation of cells in the adventitia, so much so that it looks, in a transverse section, like a beautiful rainbow around it. I do not know of any other pathological lesion which shows such conditions as those of syphilis; the only resemblance to it is found in sections of the umbilical cord, and sections of a myoma of the uterus. This does not interfere with the thickening of the coat, to which I did not pay so much attention, but which Dr. Councilman, by careful observation and staining, has found. This is what I have, without staining, mistaken for fibroid thickening.

In regard to the distinction between syphilis of the lungs and tuberculosis of the lungs, I would say that if there is laryngeal trouble associated with the pulmonary affection, then in syphilis the laryngeal trouble precedes the disease in the lungs, and that in laryngeal tuberculosis there is preceding disease of the lung. I would exclude syphilis of the lungs if there is no laryngeal ulceration or inflammation.

DR. LAWRENCE F. FLICK: It seems to me that the most forcible conclusions to be drawn from this paper are: first, that syphilis of the lungs is a very rare disease; and, secondly, that there is no such thing as syphilitic phthisis. I believe that I have seen one case of syphilis of the lungs; my only reason for this belief is that the patient recovered under very large doses of iodide of potassium. I thought, at first, that the case was one of phthisis, but upon obtaining a history of syphilis I placed the patient upon large doses of iodide of potassium, and she recovered. This is the only case that I have seen in which I had reason to believe that there was syphilis of the lungs.

DR. S. SOLIS COHEN: Of the eighty-four cases of syphilis of the lungs reported by one of the authorities cited, Dr. Councilman accepts twenty-six as instances of undoubted syphilis. On this basis, having made the diagnosis four times, I have the chance of being correct in once instance. About

a year ago I saw at the Philadelphia Polyclinic a man with a syphilitic history, the initial lesion having occurred seven or eight years previously, who had had a slight hemorrhage, evidently pulmonary, three years ago, and, about four weeks before I saw the patient, a second hemorrhage. In the mean time, the only pulmonary symptom had been slight hacking cough. There had been no wasting until within the last four weeks. There was nothing found on physical examination to show where the hemorrhage had come from. The physical signs were, in brief, those most plausibly interpreted on the supposition of interstitial pneumonitis, irregularly distributed and probably chronic—that is to say, small patches of dulness with associated increase of vocal fremitus, and vocal resonance and bronchial breathing, and in neighboring areas signs of emphysema, no significant râles and no active process. The lesions were found mostly on the right side and in the middle of the chest, although the left side was also affected. A careful examination of the sputa failed to show bacilli, and the patient lost his cough and gained weight while taking iodide of potassium. I admit that this is a vague history, but the diagnosis of syphilis is more plausible than any other. In three other cases I have felt justified in making the diagnosis of pulmonary syphilis, but have not been able to obtain the post-mortem specimens. As bacteriological examinations were not made, I was probably wrong in the diagnosis. I cannot agree with the statement of Dr. Formad that there are no cases in which the signs of laryngeal tuberculosis precede the physical signs of lung disease. Whether or not the tuberculous process always exists in the lungs before it appears in the larynx I do not know; though the evidence in favor of primary laryngeal tuberculosis is accumulating. I have had the opportunity of seeing in my brother's practice three cases in which the clinical evidences of tuberculosis were discovered in the larynx before a very careful examination was able to elicit them in the lungs.

In the case that seemed to be one of pulmonary syphilis there was no laryngeal involvement.

DR. COUNCILMAN: I should probably have said more in regard to the clinical features of the disease. As I have said, the most of the cases reported in the literature are chiefly clinical. One of the cases, which is often cited and accepted as a case of syphilitic disease of the lung, is that of von Cube, reported in Virchow's *Archives*. In this case the man after a clear history of infection had several copious hemorrhages. There were signs of softening, and on several occasions portions of tissues were coughed up, which were examined microscopically, and the diagnosis made that they were portions of gummata. There is, however, no evidence from the character of the tissue, to regard this case as other than one of lung abscess. What the abscess was due to is another question. A similar case is reported by Guntz. In this case portions of the expectorated material were examined by Lancereaux, who found in them a small round-cell infiltration, and concluded from this that they were syphilitic in character. A number of cases of syphilis of the lung have been reported by Fournier in his lectures. Schnitzler, of Vienna, reports six cases, all of them with laryngeal trouble, but in none was there an autopsy.

Of course, it does seem rather rash to generalize from so few cases, and to

say that there is no such thing as syphilitic phthisis. It seems to me, from the nature of the disease, that syphilitic phthisis would be exceedingly improbable. Although the syphlitic lesions of the lungs are, in many respects, similar to those of tuberculosis, yet there is a striking difference in the absence of ulcerative processes in the bronchi accompanying the pneumonia. In tuberculosis there is involvement of the bronchi, and this opens the way to the entrance of other organisms than the tubercle bacilli, possibly pus-organisms, which would aid in causing softening and breaking down the caseous tissue. There may be a syphilitic ulceration of the bronchi similar to that which occurs in the larynx and trachea, but this is not necessarily accompanied by lung lesion at the place of ulceration. At the spot where the lung lesion takes place, the bronchi are closed by the same process which closes the alveoli.

The changes in the vessels are exceedingly interesting. They are rare pathologically, and where we find them in other diseases they seem to have been produced by ptomaïnes of bacteria rather than by the bacteria themselves. Very similar lesions of the vessels are found in diphtheria and other infectious diseases, and they do not seem to be associated with the presence of organisms in the part affected. In the syphilitic lesion in the lungs the question is, whether the lesion in the vessels is due to the organism itself, or to some poison produced by the organism, for we must admit that syphilis is due to a living organism. The lesion is not of the nature of an ordinary arterial sclerosis. It is especially marked in the capillaries, and is less prominent in the small arteries. This hyaline degeneration can be well studied both in the capillaries of the lungs and in the glomeruli of the kidney. It seems to be akin to the amyloid degeneration, but we know no more in regard to the hyaline material than we do of the amyloid. The glomerular changes in the kidney, which are accompanied with fatty degeneration of the epithelial cells, are probably secondary to the hyaline degeneration of the capillaries of the glomerulus. The same thing is more or less present in the lymph-glands. The perivascular changes which have been referred to are present, to a certain extent, in the lung. One finds this small-cell infiltration always more or less in the neighborhood of the vessels. In the primary lesion of syphilis and the skin lesions this is a marked feature. I never have been able to make out from my study whether one does have the same affection of the capillaries in the beginning lesion that we have found in the lung and kidneys. Of course, the finding of such a lesion of the vessels always present in all sorts of syphilitic lesions would throw much light on the general pathology of the disease.

TREATMENT OF THE UPPER AIR-PASSAGES IN PHTHISIS PULMONALIS.

By HARRISON ALLEN, M.D.

[Read January 28, 1891.]

I UNDERSTAND by the nature of the subject to which I am expected to respond that the proper treatment of the upper air-passages in phthisis pulmonalis is to place the structures therein contained in the best condition possible. Hence, my remarks, in the main, will be applicable to prophylaxis. I will give a general account of the conditions in the breathing tract outside of the chest which may influence those within it. I arrange the subject-matter under the following headings:

First. Influence by Continuity.

Second. Transfer of Mucus from the Nose and the Pharynx to the Larynx.

Third. Transfer of Cold Air to the Larynx, etc.

Fourth. Transfer of a Morbific Element.

Fifth. Invasion after Operation.

Sixth. Reflex Action.

DIRECT INFLUENCE BY CONTINUITY.

The physician is often asked whether or not throat disease may not sooner or later involve the lungs and lead to pulmonary consumption. While it is true that, in a great majority of cases, disease in the throat never excites pulmonary disease, it cannot be denied that such a possibility exists. So careful an observer as L. Elsberg (*Connection of the Throat and other Diseases*, N. Y., 1870, p. 4) believed that in many cases the lungs may become secondarily involved; but says that in some forms of throat ailment (although he does not especially mention any condition) the rational symptoms of tuberculosis

are present, and fatal results may ensue when the lungs remain entirely unaffected.

Dr. J. E. Schadle reports a case of nasal cough in a subject predisposed to pulmonary consumption. There was an excessive chronic discharge from the nasal passages. The family history was discouraging—a parent and three sisters having died from tubercular disease. Laryngitis supervened upon the pulmonary and nasal symptoms, and was naturally assumed, under the circumstances, to be of a tubercular nature; nevertheless, a treatment pursued with a view to eradicate the cough by treatment of the nasal passages and the larynx entirely removed what must have been a very serious threat to the lungs. (*Journal of the Amer. Med. Assoc.*, vol. xiv., 1890, p. 305.)

Transfer of Mucus from the Nose and the Pharynx to the Larynx and to Parts beyond.

T. R. French (*N. Y. Med. Journal*, Nov. 13, 1886) believes that the manner in which diseases of the nasal passages may affect the lower portion of the respiratory tract is, in part, by the direct fall of the discharge from the nose into the larynx. There is no doubt that in the course of its descent there is a disposition for the mucus to cling to the posterior wall of the pharynx either in the shape of gutta or by the deposition of a diffused, tenacious mass to the surface. The mucus is liable to involve the delicate posterior laryngeal region and in this way to invite the development of cough.

Transfer of Cold Air to the Larynx, etc.

French also calls attention to the habit of mouth-breathing, carrying the air dry and unfiltered directly into the larynx or trachea and exciting irritation in the lower respiratory tract. This statement has been abundantly confirmed and may be considered as established.

James Carmichael (*Edinburgh Med. Journal*, Oct. and Nov. 1886) believes that laryngeal, tracheal, bronchial, or even pulmonary, collapse may follow upon coryza, and that bronchial catarrh in children often ensues on neglected nasal conditions.

Invasion by Transfer of a Morbific Element.

Dr. Miller, of Berlin, mentions an instance occurring under his own observation in which a fragment of tooth infected with the germs of actinomycosis, being lodged in one of the smaller bronchial tubes, car-

ried secondary deposits of fungus into the lungs, with a fatal termination.

Dr. Thost, in the course of an essay entitled "Connections between the Diseases of the Nose and Lungs" (*Hamburg Society of Physicians, Trans. of meeting of May* 17, 1887), claims that in pneumonia the lungs were frequently affected through the nose. He found the coccus of pneumonia in different diseases of the upper air-tract, especially in ozæna.

Dr. W. C. Glasgow (*Amer. Laryngological Soc. Trans.*, 1889) claims that an analogous condition exists in the lungs to that sometimes seen in the throat; for example, solid œdema of the lungs resembles in many respects that seen in the fauces in the same individual. He maintains that the drawing of such analogy is strictly legitimate, since he has seen solid œdema of the fauces exist in connection with the pulmonary form of the disease, and also from the fact that there are frequent alternations of the two forms in the same general crisis.

Invasion after Operation.

Operations upon the tonsil are known to be followed in some instances by bronchial pneumonia, which is particularly liable to follow attempts to remove tumors of the tonsil by external excision, or it may follow ordinary amputation. According to the elder Gross, "After the removal of the tonsil the patient should be confined several days to a moderately warm apartment, and take, if necessary, on account of the severity of the resulting inflammation, an active cathartic. I have heard of several cases in which death was caused by premature exposure." I remember hearing a clinical lecture delivered by Gross in which he said that the cause of this death was pneumonia.

Operations upon the base of the tongue are liable to excite inflammatory sequelæ of the lungs. The inflammation does not appear to be septic.

Reflex Irritation.

According to Krause (*Deutsche med. Wochenschrift*, 1886, No. 32), there appears to be a special relation existing between the fifth nerve and respiratory functions, so that all affections of this nerve (which are numerous) may create reflex disturbances in the act of breathing. This general proposition will admit of no exceptions, so that it is important in cases of obscure spasmodic conditions of the lungs and bronchi to exclude all possible sources of peripheral disease which

involve the filament of this great nerve. A sharp, reflex cough is often the sign of a foreign body in the nasal passage; laryngeal spasm may have its origin in the lining membrane of the nose or in the teeth; but it would be impossible to particularize the numerous instances in which clinical conditions of the trigeminal nerve and respiration go together.

It is an interesting circumstance that in the respiratory reflexes which arise by excitation of the ends of the great fifth nerve, the ophthalmic group appears to be excluded.

But the most important theme in an essay on the treatment of the upper air-passages in pulmonary phthisis is the local means of destroying the tubercular deposits therein developed. These are so rarely found outside of the larynx that no special consideration of such is demanded. In the larynx it is far different. Repeated inspections should be made of the larynx in pulmonary phthisis; should laryngitis occur local treatment must be instituted to destroy secondary deposits of tubercle.

It goes without saying, that, upon the appearance of the symptoms attending laryngeal phthisis, the general state of the patient is at once made profoundly worse; the difficulty in swallowing, the constant teasing sensations referred to the throat, and the nocturnal pains, affect the patient most unfavorably, and often determine the downward course toward the fatal issue of the disease. It therefore becomes necessary not only to treat the laryngeal lesion, but to prevent, as far as is possible so to do, the occurrence of such complications. I do not know of any systematic attempt at prophylaxis in laryngeal tuberculosis, but I would suppose, where the conditions favored,—as, for instance, in an infirmary or hospital where special attention to the care of consumptive patients is given,—that systematic inhalations of a weak solution of corrosive sublimate—say 1 to 10,000 or 1 to 5000—might be attempted with advantage.

CLIMATIC TREATMENT OF PHTHISIS.

By J. P. CROZER GRIFFITH, M.D.,
PROFESSOR OF CLINICAL MEDICINE IN THE PHILADELPHIA POLYCLINIC; PHYSICIAN TO ST. AGNES AND THE HOWARD HOSPITALS, AND TO THE RUSH HOSPITAL FOR CONSUMPTIVES.

[Read January 28, 1891.]

THAT change of climate is one of the best—and sometimes the only—means of successfully treating phthisis is so universally admitted that it seems almost unnecessary to make mention of it. There are, nevertheless, certain details regarding it which it may be not without interest to pass in review. For centuries this method has been in repute. The Romans used to send persons with ulcerated lungs to regions where they might inhale the balsamic odors from the pines, and Galen advised that phthisical patients be sent to localities in which the air was dry.

Even those who write upon the "home treatment" of consumption admit the value of climatic treatment where it can be carried out. It goes, of course, without saying that the vast majority of phthisical patients, owing to pecuniary or other disability, cannot be sent away from home. The all-important subject of the means to be employed for the recovery of health in these, I cannot now treat, but must confine myself strictly to the subject of the influence of climate upon the disease.

I am myself so thoroughly convinced of the value of climato-therapy in phthisis, that were I assured that I had incipient phthisis, however slight, neither inhalations of oxygen, nor the use of compressed or rarefied air, nor the breathing of hot air, nor enemata of foul air, nor trial of Koch's inoculations, nor pulmonary gymnastics, nor the ingestion of cod-liver oil, iron, arsenic, digitalis, creasote, or any other drug should prevent me—if in any way I could compass it—from leaving a climate such as this for some more propitious one. And yet there are the sceptical—there always are, of every good thing.

Let me, however, give you as samples the histories in brief of two cases which were sent to parts of the world far removed from here and from each other—the Austrian Tyrol and Colorado. They occur to me, because I have heard from each of them within a short time. The first patient developed apical phthisis some five or six years ago. Being a man of means, he travelled, chiefly to various parts of the eastern United States, remaining in each place but a short time, and returning again home. While away he improved, but always lost again on coming back. Finally, his cough grew worse; there was slight hæmoptysis, and examination showed decided depression at the left apex with dulness on percussion, bronchial breathing, and râles. I sent him to Meran, in the Austrian Tyrol, where he remained for over a year. On his return, I was delighted to discover that the dulness on percussion, depression, and bronchial breathing had entirely disappeared, leaving nothing but a few râles. An improvement such as this had not been effected by all the medicinal and hygienic treatment to which he had been previously subjected. I told him, however, that he had returned too soon, and the event proved the truth of this. He was, shortly after returning, debilitated by a very severe attack of herpes zoster, and the subjective and objective symptoms of the phthisical affection returned in full force by the end of a year. He has again gone to Meran, where he now is, and is doing remarkably well. He has no cough at all, and only slight expectoration on rising in the morning. Can he be induced to remain sufficiently long, I have no doubt of his complete recovery.

The other patient is himself a physician from a neighboring city. He called upon me last July on account of obstinate cough, with loss of weight and strength, which drugs, rest, and a temporary mountain sojourn had failed to relieve. He suspected phthisis, and wished to have a diagnosis made. Neither bronchial breathing nor impairment of percussion resonance could be detected, but there were a large number of râles at the left apex, and a few on the other side. Tubercle bacilli were present in the sputum. I told him there was no doubt he had incipient phthisis, and advised him by all means to go to Colorado and begin the practice of his profession there as soon as he felt able. He did so, and wrote me the other day, saying that he had gained twenty-two pounds, but asked my advice about coming on to take the Koch treatment, as he did not believe that he was yet quite cured! My answer can be readily imagined.

But cases like these are known in numbers to all of you. Only a short time ago one of the members of this Society told me that, visit-

ing in Denver recently, he sat down to dinner with, I think, fifty men, all of them as hale and hearty as one could wish to see, though all, or nearly all, of them had gone West on account of trouble with the lungs.

Now, as to the way in which climate can act in curing phthisis. If it is the fact, as most of us certainly firmly believe, that phthisis is the direct result of the growth of the tubercle bacilli in the lungs, the question naturally arises how climate can in any way affect the growth of these organisms after they have once found a nidus in the system. This question cannot be answered with positiveness. One matter bearing upon it is, however, nearly certain. It would seem probable that the only reason that all of us do not take the disease is that, either from the good condition of the general health, or from some peculiar, unsuitable state of the respiratory tract, the bacilli, which we all probably inhale at times, do not find in certain individuals the conditions suited for their development. Given, then, a patient with pulmonary phthisis, our efforts must be to render the lungs again of such a quality that bacilli already present can no longer thrive and multiply. It seems beyond question that certain climates have the power of accomplishing this desideratum in some way unknown to us, but certainly more effectively than any other known agent. What peculiar climatic features they are which have this power is, as yet, not determined with definiteness. The most generally accepted view is that high altitudes, as a rule, are inimical to the development of phthisis, and conducive to the recovery of those already affected; while a low elevation above tide-water, especially if combined with dampness, continued high temperature, or frequent changes of temperature, favors its development. Particularly are writers almost at one in reference to the favorable action of high altitudes. Phthisis is of rare occurrence, for example, in the high mountain cities of Mexico, in spite of the unfavorable influence exercised by the bad hygiene and the employment of the inhabitants largely in mines. The disease is almost unknown in the high plateaus of South America, and rare in the high portion of the western United States. Switzerland is, on the whole, remarkably free from it, and it is very rare in the highlands of upper Egypt. In the western Highlands of Scotland, too, it is uncommon as compared with other parts of the British Isles.

It is not yet definitely understood whether the immunity of the dwellers in high altitudes is due to the low barometric pressure or to the purity of the air. The view has not found favor that it is in any way connected with the greater depth of the respiratory act; nor

does the statement that microbes live with greater difficulty at a high elevation satisfactorily explain it. That the influence of high elevation is not due, at least entirely, to the low barometric pressure seems probable, since, as is well known, prolonged sea voyages are often of great benefit to phthisical patients. Moreover, some islands, as Iceland and the Hebrides and Shetland Islands, are singularly free from the disease; and the Kirghis enjoy an absolute immunity, although they inhabit steppes only a hundred feet above sea-level.

It has been long assumed that odors of turpentine and allied substances coming from pine forests are of value in the treatment of phthisis, and it has been claimed that to this factor sojourn in the Adirondacks owes the undoubted advantages often exercised by it in many cases of phthisis. There are clearly, however, other important factors, since otherwise all regions filled with these woods should exert the same favorable influence. Yet there are many such districts—as Maine—where the mortality from phthisis is high. One might argue that the mortality in such places was the result of too great a degree of dampness; but, in answer, it may be noted that many islands, as already stated, where the air is to an extent damp, suffer but little, if at all, from phthisis.

In fact, the prevalence of the disease does not seem to be connected with any geographical position or condition of temperature.

Our knowledge in this regard may be summed up by saying that change of climate is very often of the greatest benefit to phthisical patients, and that, as a rule, this benefit seems to be intimately associated with elevation above tide-water, though there are many localities with no considerable altitude where a good effect is often exerted upon the disease.

It will repeatedly be observed that the relation of a patient to a certain climate is very much like that which exists, or should exist, between a man and his wife. Just as one man finds in his wife's character and disposition that which entirely satisfies his moral nature, while his neighbors, perhaps, can see no good in her at all—so one phthisical patient may thrive in a certain locality, while the next patient, with lungs in apparently the same condition, is never comfortable there, and suffers a continual deterioration in health.

It is this fact which renders the matter of choice of climate so exceedingly difficult. It is impossible entirely to determine the nature of what might be called *climatic idiosyncrasies* in patients. We are, therefore, obliged, in the choice of a climate for a patient, to follow certain general rules.

First is to be investigated the individual susceptibility to cold and heat, respectively. We must carefully inquire whether the patient is always chilly in winter, or whether he is exhausted and depressed in summer. It seems to me to be folly, as well as cruelty, to compel an anæmic, emaciated individual, who is always chilly and whose circulation is feeble at the best of times, to spend a winter in a cold, bleak, windy, northern elevation. While the Adirondacks in winter are certainly of benefit to many, it would seem almost proven that they cannot but disagree with others; in fact, experience proves that they do. On the other hand, there are many patients to whom even the early spring warmth of Florida is invariably depressing, and who reap no benefit from sojourning there. It is, after all, hygiene throughout which we must keep in mind, and not merely the effect of a certain climate upon the lung alone, as though it did not belong to the body.

Another factor of some importance in selecting a locality is a knowledge of the *diurnal* range of temperature. The annual average temperatue, and the average for each month, can usually be ascertained without difficulty for the more frequented health resorts, but the daily variation is not so easily to be learned; and yet it is on just this factor that the comfort of the patient may depend. A perfectly equable temperature is certainly of great advantage. Unfortunately it is not so apt to be found with dry air and elevation above the sea as it is at lower regions. Although elevation is, as a rule, much the most important, yet in some cases it will appear best to select the sea on account of the smaller diurnal temperature range.

Still another matter is the nature of hotel accommodations and other creature comforts; and this has to be considered most carefully in reference to the individual. Though a strong man with beginning phthisis, which has had but little effect upon his general health, may do well if sent to a region where he will spend his days in the saddle and his nights in the open air; it is clear that for women and many male patients no such regime can be prescribed.

Patients want to know all these and similar details before leaving home, and it is well if the physician can help them in this respect. In many cases, however, circumstances prevent more than the pointing out of a general plan of action; especially as the number of places in different parts of the world recommended as health resorts in phthisis is so large.

Individuals, with beginning phthisis, who are unwilling to make a radical change, or in whose case the physician does not deem it expedient, might seek Florida in winter, returning northward in the spring

by slow stages, stopping *en route* in Georgia and North Carolina. In the summer some mountain resort should be selected, preferably the Adirondacks. There are, nevertheless, weighty objections against this course. It is very difficult to return North without feeling the bad effect of the change of temperature; while a still greater objection is that the length of time, during which this continuation of travel must be persisted in, is too great for the patience of the invalid, thus kept so near home and occupation, and yet debarred from them. I have, however, seen cases presumably of phthisis in its earliest stages, apparently entirely cured by a short absence from home in some such manner as this. It might be well in some instances to begin treatment in this way; but if the physical signs are well marked, only the shortest trial should be given to this plan, as valuable time may be lost thereby. These more advanced cases, if in fairly good condition, and offering good hope of final recovery, should at once be subjected to a radical change of climate—either for an indefinite period or for life.

The question whether a station in the mountains or at the sea-level is to be selected, must be decided to some extent in accordance with the idiosyncrasy of the patient, as far as this can be determined in advance. As a rule, a mountain resort is far preferable, and should be chosen whenever practicable. Statistics certainly show that the results in the mountains are better.

Our own country offers some excellent localities for phthisical patients, in which a radical change of climate can be obtained. Of all of them, perhaps the high altitudes of Colorado are to be preferred, since here can be found comfortable accommodations, combined with pure, dry air, and high elevation. In the "parks" of this State we find table-lands of 10,000 feet elevation above the sea, protected by surrounding mountain-peaks, and with an annual range of temperature less than in the Eastern States of the same latitude. Sudden diurnal changes do occur, it is true, but to no greater extent than in all elevated regions. The rainfall is, also, very slight. It has been stated that the dust prevalent as a result of this is irritating to the respiratory tract; but this is denied by those who have accurate knowledge in the matter. In spite of the thousands of phthisical patients who frequent the State, the death-rate from consumption is very low.

New Mexico and Arizona offer somewhat similar advantages in the way of climate; but the facilities for living are not so great. The summers, moreover, are apt to be very hot. There are localities in Texas, too, which are excellent.

Southern California presents many advantages, not the least of

which is that patients can easily vary their elevation from that of the sea-level to a considerable mountain height, according to the different seasons of the year, and to what is found to suit best their health.

Florida is not so favorite a resort as formerly, and physicians preferring high altitude will not, of course, recommend it at all.

Yet the greatest difficulty in choosing a health-resort in the United States is that the patients have no large selection, and the stations are often very widely separated; so that invalids may be obliged to remain for months or years in one or but few localities. In this respect Europe offers many advantages.

Phthisical patients in Europe can make choice from a large number of summer stations, all equally good, or can go from one to the other as fancy dictates. A winter one may be chosen in like manner. The passage from one to the other may be made gradually by means of intermediate stations whose climate is midway between that of the others.

Nowhere does the climatic idiosyncrasy come into play more than in the choice of quarters in Europe; what suits one patient for winter, for example, being entirely too rigorous for another. For summer time there is, as a rule, probably no better place than the high valleys of Switzerland, and prominent among these is the Engadine valley. This valley, however, is scarcely free from snow before the middle of June or the first of July, and becomes cold early in the fall; so that, as a pure summer resort, it is not long tenable. It is also subject in summer to cold and disagreeable winds. In spite of this it is unexcelled by other localities for the climatic treatment of phthisis. Davos-Platz also enjoys a similarly good reputation. The neighborhood of Zermatt also fills the requirements of elevation and coolness during the hotter summer months. There is no difficulty in choosing among a number of other places equally well adapted. Lower valleys may be selected if the summer is unusually cool, but the higher elevations are much to be preferred, as far as freedom from phthisis is concerned. Farther east there are various resorts in the Dolomite region which are highly recommended. There are numerous other places throughout the mountains of Germany, but for American patients Switzerland and the Tyrol offer every advantage to be derived from climate, while they possess other desiderata not to be found elsewhere.

For early summer and early fall other localities than those mentioned are to be preferred. The choice of such a station is a rather more difficult matter. Some of the lower portions of Switzerland may be selected, as Interlaken, the neighborhood of Lucerne, and the

shores of Lake Geneva. Probably the latter situation is the best. Vevey and Montreux form here excellent intermediary stations. Ischl and Reichenhall, in Austria, are also recommended, and the Black Forest, in Germany, presents many attractions. One station, which offers in some respects peculiar advantages as an intermediary station, is Meran, in the Austrian Tyrol. It is beautifully situated, and sheltered from the winds; and patients are able to spend a great deal of the time in the open air.

Finally, as to the choice of a winter station. For weakly individuals, who shun any degree of cold or variation of temperature, it may not seem best to select an elevated station. For such the south of France, the south of Italy, Sicily, or the Riviera, have long and justly been popular. Or the patients may pass from Europe into Egypt, Algiers, or Morocco. But for uniformity of temperature and of barometric pressure there is probably no place known equal to the Canary Islands. Madeira, once so popular, has fallen off greatly in general favor. For a large number of phthisical persons a dryer, colder, and more bracing climate at a greater elevation is more suitable, even in winter. For these Meran is eminently adapted, provided only a moderate degree of cold is desirable. The sunshine here is always quite warm, and patients are able to sit out of doors in it the greater part of the day.

Still more popular have the Engadine valley and Davos-Platz become, even as winter stations. The cold, it is true, is severe, but it is dry cold, and the unpleasant raw winds of summer are absent at this period of the year, while the thermometer in the sunshine registers high, as is usual in all climates of high altitude.

It is to be borne in mind as an inviolable rule, that such a climate is to be selected either for summer or winter, as will allow the greatest amount of exercise in the open air with the least discomfort to the patient, and with the greatest advantage to the general health.

What has been said is but the briefest and a necessarily incomplete outline for governing the choice of climate for the patient. A few words must be added on what might be called the choice of the patient for the climate.

There has existed a widespread prejudice against high altitudes in cases of decided tendency to hæmoptysis. This prejudice is, in the opinion of the best authorities, unwarrantable. Patients with this tendency are, perhaps, even safer in the mountains than at the sea-level. The cases most suited for climatic treatment of any kind—as, indeed, for any other method—are those with but slight infiltration,

with but few symptoms of the disease, and with strength sufficient to permit of abundant exercise. These patients should, as a rule, be sent to high altitudes for summer, and very probably for winter, also. Other cases, with a greater extent of pulmonary lesion, and with a less degree of strength or of resistance to cold, will probably need the lower, warmer winter resorts, followed by the intermediary stations, and these again by the highest elevations for the summer months. In a still more advanced stage of the disease, especially where there is much elevation of temperature with severe subjective symptoms, the patient is not in a condition to stand much travelling, nor to take much exercise. In such cases, cold situations are out of the question. A warm, equable climate is to be chosen, and the nearer home the better. If improvement take place, a more mountainous locality should be sought as soon as possible. The existence of fever is not, however, *per se*, a contra-indication to high altitudes. It has often been observed that patients lose all fever soon after reaching the mountain resorts. Nor is the presence of a cavity a contra-indication in the selection of high elevations, provided the lung is not evidently rapidly breaking down. Cases which are very far advanced and evidently hopeless should not, of course, be sent away at all; for only a hastening of the final end of the disease can come to the patient, with disappointment to the family and reproach to the physician. It should be also clearly explained to patients, in whatever stage the disease is, that change of climate is not an infallible cure; and, further, that with it must be conjoined all other necessary hygienic and dietetic measures, together with the employment of such medicinal agents as are indicated by the disease.

[The author would acknowledge his indebtedness to the writings of a number of physicians, to which no direct reference has been made in the text. Among these are the following: *Wanderings in Search of Health*, H. C. Taylor, 1890; *Phthisiology*, G. A. Evans, 1888; *Climate and Health Resorts*, Burney Yeo, 1890; article on "Treatment of Disease by Climate," by Hermann Weber, in *Ziemssen's Hand-book of General Therapeutics; Etiology, Diagnosis, and Treatment of Tuberculosis*, H. V. Ziemssen; articles by Shattuck, Loomis, Solly, Westbrook, Platt, Gihon, Curtin, Knight, Bowditch, Bruen, and others in the *Transactions of the American Climatological Association;* article on "Consumption," by Ruehle, in *Ziemssen's Handbuch der spec. Path. u. Therapie.*]

THE NERVOUS SYSTEM IN THE TREATMENT OF CONSUMPTION.

By THOMAS J. MAYS, M.D.

[Read January 28, 1891.]

If one fact is more evident than another, it is that pulmonary consumption is not a disease of the lungs exclusively. It is not seldom that we meet patients who complain of fatigue, of anorexia, of wasting, of cough, of dyspnœa, of rise in temperature, of shooting pains in the trunk or extremities, and who present all the symptomatic appearances of phthisis, and yet show no active outbreak of pulmonary disease. The cautious practitioner observes in these manifestations a foreboding of what is sure to follow, sooner or later. He knows that for practical purposes such persons are as much sufferers from consumption as if they showed the active physical signs of the disease in their lungs already, and treats them accordingly.

If pulmonary consumption is not essentially a disease of the lungs, what particular tissue or texture does it primarily invade? From a careful study of a large number of cases, I have become firmly convinced that consumption is fundamentally a disease of the nervous system, but it is not my intention or province this evening to dwell on the evidence which supports this theory, but to consider the relation which the nerve element in this disease bears to its treatment, and to refer only to this pathological association in so far as it assists in showing the latter in its proper light.

Now, in order to bring the salient points of my subject before you, I shall briefly, in the first place, consider the frequent association of consumption with diseases of the nervous system; and, in the second place, discuss the nerve-degenerations which, so far as I know, are probably constantly present in this disease.

Dr. Maudsley says (*Pathology of Mind*, p. 233) that when a family decays, the last member not unusually dies either from phthisis or

insanity; that phthisis alternates with insanity, and the reverse; and that one-fourth of the deaths in asylums for the insane are caused by phthisis. Dr. Clouston, an equally good authority, states that phthisis occurs about twice as frequently in the insane as in the sane. The post-mortem researches of Dr. J. Crichton-Browne also confirm these opinions.

Dr. Stevens, of New York, in his work on *Functional Nervous Diseases* (p. 139), records the family history of one hundred of his patients who suffered from various nervous diseases and in whom marked errors of refraction had been found. The collective members of these patients' families, including parents, sisters, and brothers only, were five hundred and ten in number. Of these, one hundred and four suffered and died from pulmonary consumption; one hundred and fourteen from cerebro-spinal meningitis, epilepsy, chorea, insanity, apoplexy, and other nervous disorders; seventeen from Bright's disease, and twenty-two from rheumatism and heart disease. In other words, consumption and nervous diseases prevailed to the extent of 40 per cent. (about 20 per cent. of each), while Bright's disease, rheumatism, and cardiac disorder to the extent of 8 per cent.

Professor Grasset has also shown ("On the Relations of Hysteria with the Scrofulous and Tubercular Diathesis": *Brain*, vols. vi. and vii.) that a similarly close relationship exists between hysteria and consumption. He cites a large number of cases of hysteria, in nearly all of which there existed a strong family history of phthisis, and in many of these hysteria was transmuted into consumption, and *vice versâ*.

Moreover, pulmonary consumption is also closely affiliated with other diseases in the pathology of which nerve degeneration plays a most prominent *rôle*. This is true of leprosy, of beri-beri, of pellagra, of alcoholism, of syphilis, of herpes zoster, of mercurialism, of plumbism, etc.

Then, when we come to study the nerve degenerations which are so intimately associated with pulmonary consumption, the neurotic element in this disease becomes still more conspicuous. Thus, it is a well-recognized fact that section of the vagi or injury to the medulla is followed by œdema, hæmoptysis, and inflammation of the lungs. Equally well is it demonstrated that compression of these nerves by tumors in the neck, or by aneurisms within the thorax, etc., leads to pulmonary consumption. During a recent research on this question I found the records of nearly one hundred cases of phthisis in which the vagi were disintegrated through the pressure of aneurisms, of

enlarged bronchial glands, or tumors, or became diseased from other causes. Beside these, I found the reports of six cases of paralysis of respiration; seven of pulmonary œdema; four of pulmonary infarcts; seven of bronchitis; and twenty-seven cases of pneumonia in which the vagi were diseased. Dr. F. L. Hahn, in a post-mortem investigation of a number of phthisical subjects,[1] found alterations in the pneumogastric and phrenic nerves. During life, he states, these subjects suffered from facial, sciatic, and intercostal neuralgias, pains in the region of the sternum and at points along the spine, arthralgia, muscular pains, hyperæsthesia, analgesia, contractions, paresis, and dilatation of the pupil on the affected side. As to how far the peripheral nerves are involved in the phthisical process we have the work of Dr. Jappa[2] (*Zur Frage über die veränderungen der peripherischen Nerven bie Schwindsucht*) to show that the degeneration in these structures is quite remarkable. He examined the sciatic, post-tibial, internal plantar, crural, internal saphenous, superficial peroneus, median, ulnar, and radial nerves of the bodies of fifteen persons whose death was caused by pulmonary consumption, and in every instance marked deterioration existed in most of these nerves. The changes were in the axis-cylinder and perineurium, as well as in the sheath of Schwann, and the author says they should be regarded as parenchymatous in character. The intensity of the morbid changes was greater in the peripheral endings than in the trunks of the nerves. In all these cases there existed during life only the ordinary nervous symptoms found in the phthisical, such as some undefined neuralgias and muscle-pains, general hyperæsthesia, high fever, and emaciation.

From these facts it is evident that nerve degeneration and pulmonary consumption are constant accompaniments, and the only reason why the nerve derangement is not more often found in this disease is because it is not sought after. What relation does the one bear to the other? Is the nerve disorder a cause or a consequence of the pulmonary trouble? From the very nature of the case this is difficult to establish on a positive basis; but when we view the subject in a broad light, and consider that hæmoptysis, pulmonary infarcts, and œdema, as well as catarrhal pneumonia, are produced by division of the pneumogastric nerves; that continued pressure of aneurisms and tumors on these nerves leads to phthisis; that phthisis follows alcoholic and

[1] L'Union Médical, February 9, 1874. Chicago Journal of Nervous and Mental Diseases, vol. ii. p. 448, 1875.

[2] Neurologisches Centralblatt, Bd. vii., 1888, p. 425.

syphilitic degeneration of the same nerves; that phthisis is very prone to develop in the insane or in the neurotic, I think it becomes very palpable that the pulmonary is consequential to the pneumogastric disorder. We certainly do not manifest a more illiberal spirit when we come to reason on the relation which exists between disease of other organs than the lungs and their nerve-supply. Sir James Paget relates the case of a patient in which the median nerve was compressed by callus thrown out to repair a fractured radius. Inflammation and ulceration of the thumb and middle fingers took place, which resisted all treatment until the wrist was so bandaged that the parts on the palmar aspect were relaxed and the pressure on the nerve removed. So long as this was done the ulcers became and remained well; if not, the ulceration returned. The same pathological connection obtains in other parts of the body. Injury to the trigeminus, within the cranium, is followed by cloudiness of the cornea, inflammation and ulceration of the lips and gums; and sloughing of the heels and of the back is produced by a lesion of the spine. If we believe that sloughing in the heel or over the sacrum can exist on account of a spinal lesion, or that ulceration of the thumb and middle fingers may be produced by the median nerve being compressed by callus, then we can, with equally good logic, conclude that pulmonary phthisis is the result of a degeneration of the pneumogastric nerves caused by pressure of tumors or aneurisms on the same. If we admit this, and I can see no reason why we should not, it naturally follows that phthisis may arise in consequence of any cause which has the power of disintegrating these nerve structures.

This view of the origin of phthisis is also confirmed by its clinical history. Diseases of the brain and of the nervous system and phthisis travel hand in hand. All of these affections are comparatively absent among savages and are universally present in civilized life. Look where we may, we find that the causes which produce the one are also operative in the case of the other. Wherever the struggle of life enforces a high state of nerve-tension, or where indulgences and excesses entail an inordinate waste of nerve-force, there consumption and diseases of the nervous system exist, either separately or simultaneously. But whatever view we take of the origin of phthisis, I trust that I have made it sufficiently plain that the nervous lesions in this disease are constantly present, and he who desires to treat it successfully cannot afford to ignore them.

When viewed from the neurotic standpoint, the treatment of pulmonary consumption divides itself into rest, dietetic, and medicinal.

Of these, rest is the most important, although no good results can be expected from it alone, unless it is reinforced by the faithful administration of an abundance of nutritious food. The consumptive must be regarded as verging on a state of constitutional bankruptcy. All the strength that he can muster is appropriated to the performance of the essential functions of life, which are carried on imperfectly in this disease. Digestion is weak; the bowels are either constipated or are threatened with relaxation; sleep is restless and disturbed; his muscular energy is impaired to such a degree that a short walk or a small amount of physical exercise saps his strength and renders him almost wholly helpless. Yet, conscious as he is of his feebleness, he persists that the taking of exercise is essential to his getting well. Strange and paradoxical as it may appear, this feeling is not confined to consumptives, but exists in behest of a strong public sentiment. It is based on the knowledge that in health exercise gives strength. But what a difference between the body in health and when suffering from a chronic disease like consumption! The two conditions may be illustrated by comparing a banker who is threatened with insolvency with one whose credit is good. If the former pays out as much as he takes in, his finances will always be in a crippled state, and he will be in constant danger of going into bankruptcy; but if he halts—that is, if he diminishes his outflow and maintains or increases his income—his capital will accumulate, and in time he will be able to compete with other capitalists. But the banker whose credit is uninjured goes on and invests all his surplus capital—that is, he exercises his financial strength to the utmost limit of prudence—and thereby enhances and improves the integrity of the institution which he represents. So it is with the taking of exercise. If this is to be beneficial a certain amount of strength must preëxist, and by putting this strength to proper use—or out at proper interest—it will grow and accumulate; but he who has no or very little strength at the outset must reduce his expenditures and enlarge his income or else go into physiological bankruptcy. The consumptive must be made to realize that, with him, it is wholly a question of constitutional resistance; that both health and disease are quantities which constantly vary; that when he is weak the disease is strong and advances, and when he is strong the disease is weak and recedes; and that the force which he expends in taking exercise abstracts so much from the total quantity of vitality and allows so much less for the body to cope against the disease and to perform the other necessary functions.

In accordance with these principles, it has been my custom, during

the last few years, to give all my consumptive patients the full benefit of rest, so far as this could be carried out. Almost invariably, on beginning to treat such a patient, he is ordered to bed and kept there until I am satisfied that sitting up or walking around the room will not tire him. Those patients who are always tired, and many there are of this kind, I insist on remaining in the horizontal posture for a month, or six weeks, or longer. This does not mean confinement to the room; but they may be carried out in the open air and remain there during the greater part of the day—care being taken, of course, that they are warmly clothed and well protected from unfriendly currents of air. Those who are stronger are allowed to walk out and sit quietly in the open air. Patients will often demur against this protracted rest, chiefly because they do not realize the seriousness of their condition. But if they once comprehend this fully, there are very few who do not appreciate the practicability of the proposal and aid you in carrying it out.

The results which are obtained by this plan of treatment are, I am sure, much superior to the one where the patients are allowed to walk about and generally do as they please. In former times, when, in conformity with the teaching which still prevails, I believed that plenty of exercise was the one thing needful to restore the consumptive, I was often disappointed and mortified in seeing patients who had been considered well enough to leave bed and walk out almost invariably experience a relapse. Much of the successful treatment of consumption in mountain resorts is due to the measure of enforcing rest and quiet on the patients. Dr. Brehmer, of Görbersdorf, and Dr. Dettweiler, of Falkenstein, both consider an unlimited amount of exercise detrimental to the consumptive's well-being; and Dr. Vollaud, of Davos, states, in his work on the *Treatment of Consumption in High Mountains*, that rest in the open air is the first duty of the patient, and that, if he is able, he is allowed to sit out-of-doors, and if not, he is confined to bed in a well-ventilated chamber.

All our efforts will prove entirely fruitless, however, if we do not succeed in making our patients eat. Nothing taxes the ingenuity of the practitioner more, and nothing demonstrates his ability better than his success in devising ways and means whereby his patient is led to partake of a sufficient amount of nourishment. The majority of such patients not only suffer from anorexia, but loathe food. I am convinced, however, that if they can be induced to swallow food, the stomach possesses in most instances the power to digest the same. Hence, the importance of promptness and perseverance in feeding.

A small quantity of food, like half a teaspoonful of beef-pulp, a tablespoonful of the juice of fresh beef, or a glass of milk with a little lime-water, every two or three hours, will furnish a large amount of nourishment in twelve or sixteen hours, and will convince the patient that he is able to digest a great deal more than he thought he could. When they refuse or are unable to eat sufficiently, I resort to washing out the stomach, and introduce the food with a tube specially adapted to this purpose. It is astonishing as to the quantity of food which can be given in this manner, and I have seen some very excellent results follow this practice. Feeding by the rectum is another method of great value in the treatment of this disease and should be employed whenever it is deemed necessary in stubborn cases. In feeding these patients one point should always be borne in mind, and that is, that only those foods which contain the greatest amount of energy in the smallest bulk, and which at the same time confer the greatest amount of good on the body with the least expenditure of vital force in digestion, should be administered.

Additionally, we must not lose sight of the inestimable value of well-directed medication. Among the most useful agents which render support to the nervous system in this disease are antipyrin, phenacetin, strychnine, quinine, atropine, the hypophosphites, cod-liver oil, etc.; but this is a subject too voluminous to be entered into at the present time.

DISCUSSION.

DR. HARRISON ALLEN, in reply to a question as to what he considered the best treatment for laryngeal phthisis, said: The treatment of laryngeal phthisis has of late years been very much changed by the introduction of the use of lactic acid. In this method we begin with a solution of lactic acid, say ten per cent., increasing the strength as rapidly as possible up to eighty per cent., and in many instances to the pure acid. A cotton applicator is wet with the solution and applied to the affected parts with gentle friction. Hering has lately invented a syringe to inject the solution into the tissues affected. I have used this plan of treatment with admirable results, and have seen improvement begin almost immediately. My second choice in the treatment of laryngeal phthisis is the use of iodoform. This agent was introduced by Louis Elsberg, of New York, who used an ethereal solution. It may be used in the form of the powder; but as in this form it is difficult to apply, it may be mixed with some indifferent material, such as powdered starch to which a little gum arabic has been added. These applications can be made every third day, or every second day, or even daily. I believe, however, that treatment about twice a week in an average case is

sufficient. If neither lactic acid nor iodoform could be employed, my next choice would be the use of menthol, but I have had no experience with this drug. Pure boracic acid has been employed. The old method of treatment was the use of strong solutions of nitrate of silver, with which, however, I have had no experience. I should say that the lactic acid treatment is undoubtedly the best; after that iodoform, after that menthol, and beyond that a large number of agents of the groups of astringents and protectants.

DR. J. P. CROZER GRIFFITH: It will be seen that Dr. Mays and myself are diametrically opposed as to the advantage of exercise in phthisis. He will pardon me if I say that I think he has not quite fairly quoted the German observers. While it is true the German physicians in charge of the institutions at Görbersdorf and Falkenstein do not recommend unlimited exercise, yet they are decidedly in favor of a moderate amount; and most of the writers on the clinical treatment of phthisis do recommend all the exercise that the patient can take without injury. It is evident that the exercise of a man with severe hectic should be restricted. Yet even here I am exceedingly doubtful whether rest modifies the hectic of these cases. I have had a rather extensive experience in this matter during the years in which I have had to do with hospital cases. As you know, it is the custom to put the hospital patient to bed, at least for a time; and though I have watched the phthisical cases with much interest, I have never been able to satisfy myself that that the patient was freer from fever in bed than while up. It is undoubtedly true that patients who have fever, and are doing badly while confined, even to bed, will sometimes at once be benefited by getting out; especially if subject to a change of climate. The fever will often disappear entirely.

I have paid no special attention to the nerve theory of phthisis, but I do feel that we must be cautious in adopting such views. Dr. Mays has spoken of the lesion of the pneumogastric nerve in phthisis as being the etiological factor in the disease. He claims that without this lesion there will be no phthisis. Now this demands the most exact and satisfactory proof, which is certainly still wanting. A single case of phthisis in which the nerve is not degenerated will upset the whole theory. The suspicion has been in my mind for some time that in every case of extreme anæmia, such as we are so apt to find in phthisis, we shall find evident anatomical changes in the nervous system. Lichtheim found the cord intact in no case of pernicious anæmia examined by him; and he considers the change as secondary to the extreme anæmia. The lesion was chiefly in the posterior columns. I have myself seen similar changes in the cord in a case which had been under the care of Dr. Lewis. I have now some cords from cases of anæmia under observation, and I shall be surprised if I do not find some alteration of the posterior column as the result of the anæmia. One of these is a case of extreme anæmia in phthisis. Should lessions be found it would be manifestly unfair to conclude that the lesions in the cord were the cause of the phthisis; and I cannot but think that we stand in just the same relation to the changes said to exist in the pneumogastric nerves. It seems more probable that the lesions of the nerves described in cases of phthisis are the result of the anæmia purely.

DR. JAMES COLLINS: The statement has been made that savages do not present the nerve symptoms of phthisis. One of the most interesting patients that I have had was a medicine-man from among the Indians, who had hæmoptysis and phthisis. I am satisfied that the amount of phthisis among Indians is not small.

In regard to sending patients away from home, I have had the best results from sending patients to higher altitudes; but not of too great height. The greatest difficulty in the treatment of this disease is from the fact that the patient rarely comes under observation until there is more or less destruction of lung tissue. After a cavity has formed, you have a septic wound, and the patient is dying gradually from septicæmia. Septic changes will, therefore, occur in the muscular and nervous system. When a patient presents himself with a cavity in the lung it is not simply a case of phthisis, but really a septic wound. Unless you can render the air aseptic, you have all the conditions that you have in a surgical case with a wound exposed to impure air. That is one of the reasons we have such bad results in the treatment of this disease.

DR. MAYS: I stated that Dr. Detweiler and Dr. Brehmer did not advocate unlimited exercise. I wish to explain that somewhat. I think that Dr. Brehmer was the first to introduce rest in the treatment of phthisis. He had a large park surrounding his sanitarium, through which he laid out walks, and along these he placed seats, and gave his patients special instruction to walk at first only from one seat to the other. The walks were placed in such a way that they were up a slight elevation. This is all explained in his work on the treatment of consumption. Dr. Detweiler was an assistant of Dr. Brehmer for a number of years, and when he started a hospital of his own he followed out the essential parts of the system of treatment of Brehmer. Dr. Volland's opinion of the value of rest in consumption I have closely quoted. I have been much interested in the influence of exercise and rest in the treatment of consumption for a number of years. I have made a number of observations on patients before taking exercise and afterward. I have taken the temperature of the patient, then allowed him to walk a short distance, or upstairs, or do some other work, and I invariably found that if the temperature was nearly normal, it would rise. I have found that swinging a dumb-bell for five minutes would raise the temperature in a phthisical patient from normal to one and a half degrees above normal. This has also been borne out by my experience at the bedside.

In regard to pneumogastric degeneration, I stated that, so far as I knew, the pneumogastric is degenerated in all cases of phthisis. I think that this is a theory that will bear investigation. Dr. Griffith has mentioned one case in which herpes zoster occurred with a complication. This is very common, and the eruption usually occurs on the side of the lung affected. I have also found in phthisical cases herpes zoster of the neck on the side of laryngeal involvement. Whether these nerve lesions in zoster are the result or a concomitant of phthisis I do not know. In conclusion, I would say that, in the face of strong testimony on the other side, we cannot assume that the nerve change in anæmia is secondary until we have shown that blood-genesis is not under the control of the nervous system.

DR. ALLEN: There is one point to which I have called attention on other occasions, and that is the desirability of dissection in cases of phthisis. It is

surprising that these observations in regard to peculiarities in the nerves have been so long in coming before our notice. One would suppose from the great number of subjects of this disease that these peculiarities would have been noted long ago. The phthisical subject must have many peculiarities; if they have peculiarities of the nerves, they probably have peculiarities of other parts of the body. I have long supposed that they have anomalies of the vessels, possibly of the capillary network of the lungs. This is an inviting field, and I hope that some time we shall have more exact testimony in regard to these points.

THE TREATMENT OF CORNEAL ULCERS BY THE ACTUAL CAUTERY.

By G. E. DE SCHWEINITZ, M.D.,
OPHTHALMIC SURGEON TO THE PHILADELPHIA AND CHILDREN'S HOSPITALS;
OPHTHALMOLOGIST TO THE INFIRMARY FOR NERVOUS DISEASES.

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As long ago as 1873, Martinache, of San Francisco,[1] recommended the application of the actual cautery for the treatment of hypopyon keratitis, and about the same time Samelsohn[2] advocated the galvano-cautery in affections of the lachrymal apparatus, conjunctiva, and ciliary border, a method which, before that time, in the hands of Middeldorpf, Bruns, Althaus, Groh, and other surgeons, had proved its value in a variety of types of special practice. Actual cauterization of the cornea, later received the earnest recommendation of Gayet, Grandmont, Martin, and Fuchs, but at first did not meet with universal approval. Subsequently the results published by Nieden, Schweigger, Knapp, and Gruening, placed the method upon so secure a basis that the actual cautery has become a well-nigh indispensable instrument in the management of certain types of ulcerative keratitis, and is a surgical procedure constantly employed by every practical ophthalmic surgeon. A certain amount of difference of opinion exists as to the character of cases to which the heated point of either a galvano- or thermo-cautery should be applied, although there is practical unanimity among all who have had any experience, that the actual cautery is the best radical destroyer of the sloughing tissues found in ulcers of mycotic origin typified by the serpentic ulcer of the cornea; or, in the language of Dr. Gruening: "In the incipient stage of ulcus corneæ serpens, characterized by the superficial arc of propagation, the actual cautery fulfils all the requirements of a classic procedure, acting *cito, tute et jucunde.*" In the hands of others the use of the

[1] Pacific Medical and Surgical Journal, 1873.

[2] Archives of Ophthalmology and Otology, vol. iii., Part 2, p. 124.

instrument has not been limited strictly to serpentic ulcers, but also, as in Nieden's observations on more than one hundred cases, in addition to serpent and rodent ulcers, to scrofulous abscess both marginal and central, vesicular keratitis, with a patch of infiltration at its apex, parenchymatous corneal abscesses occurring in trachoma, and even examples of xerosis of the cornea. Enough has been said to emphasize what is well known, that the method is among the most suitable of those employed to check the spread of local infection in sloughing ulcers, and it remains to add to the numerous reports upon this subject the few cases that I have treated with my own hand, about thirty in number. These include:

1. Small central ulcers in children of bad nutrition, which either through neglect or imperfect treatment have tended to form an abscess.

2. Shallow central ulcers in scrofulous patients, the ulcer having a slightly turbid base, very chronic in its course, and declining to heal under ordinary remedies; in all of the cases of this character there were the appearances of former granular lids, and in one active trachoma.

3. Phlyctenular ulcers, beginning in the form of small pustules at the corneal border, speedily ulcerating and surrounding themselves by a yellow area of infiltration, and with a strong tendency to perforate.

4. Infecting or sloughing ulcers associated with pus in the anterior chamber, or, in other words, hypopyon keratitis.

5. Marginal ring ulcer, or that form which is sometimes seen in purulent ophthalmia, occurring just at the circumference of the cornea, often covered up by the chemotic conjunctiva, and very likely to perforate, because it is hidden by the swollen tissues and not observed.

6. Herpes of the cornea, one being an example of an ulcer associated with herpes zoster ophthalmicus, and the other true herpes of the cornea in which a vesicular eruption occurs, breaks down, and leaves an ulcer; that form which has been seen under the same circumstances as when herpes occurs around the lips and nose.

I will not give the clinical history of these cases, as it would simply burden the communication unnecessarily with detail, except to say that the actual cautery was applied only after other treatment had been used, either at my hands or at the hands of some one else. I have not a single bad result to record. In three of the cases perforation of the cornea took place, with evacuation of the aqueous humor, twice as an accident during the application of the cautery, and once when the ulcer had nearly perforated and Descemet's membrane had bulged forward, forming its floor, and I deliberately burned through the tissue. In

the cases of hypopyon keratitis perhaps it would have been wise, as Nieden has recommended, to have perforated the cornea with the thermo-cautery, but as they were the first ones in which I performed the operation I did not wish to do this; in the second place, the hypopyon was not of great extent, and in the third place, I wanted to see whether the application of the cautery to the surface of the cornea alone would produce absorption of the pus.

METHOD OF APPLICATION.—Various forms of cautery have been employed, the most suitable being a small Paquelin thermo-cautery, or the galvano-caustic loop, the latter in the form devised by Professor Sattler, of Erlangen, is, according to Nieden, especially satisfactory. My experience has been entirely with more crude instruments, but which have answered the purpose, either a delicate probe suitably made of platinum, according to the recommendation of Gruening, or if this is not at hand, an ordinary steel needle, about the size of a knitting-needle. According to the situation of the ulcer, and according to the condition of the iris, the eye is either atropinized or eserinized, a few drops of cocaine are instilled to produce anæsthesia, and a Bunsen burner is placed adjacent to the head of the patient, the probe is heated red hot, transferred to the point of disease, all of the sloughing material gently but thoroughly cauterized, and without undue pressure. It is not necessary to separate the lids with a stop speculum; in fact, this is probably a disadvantage, putting some pressure upon the ball of the eye. They may be parted by the hands of the operator himself, or, if he is to be trusted, by those of an assistant. In restless young children, although not necessary, it is safer to induce general anæsthesia simply for the purpose of securing perfect quiet. After the application, the eye may be washed out with solution of boracic acid, a drop of atropine instilled, and a bandage applied. This latter procedure also is not required, but it has seemed to me to make the patient more comfortable. Quite commonly, on the next day the bulbar conjunctiva is considerably injected, the eye looking angry and red. If the cautery has been applied properly, the ulcer itself is cleaner and healthier, the surrounding cornea less nebulous, and if there has been pus in the anterior chamber this, in my very limited experience, has been absorbed, or nearly so. Usually, one application is sufficient, but it is well known this may be repeated on the third or fourth day, and, indeed, several times repeated, according to the indications, provided the original destruction of tissues has not been sufficient. I have never applied the cautery more than three times to the same ulcer.

SUBSEQUENT TREATMENT.—If the case has been successful, and it is not necessary to reapply the cautery, the treatment becomes simply that of an ordinary corneal ulcer, which has been converted from a sloughing process, or from a chronic process, or from a process which relapses, into a healthy ulcer, into an ulcer with the impulse of an active stimulation, or into an ulcer with the tendency to relapse removed.

THE QUESTION OF SCARS.—It has been urged against the employment of the actual cautery, that a much more dense scar or leucoma was likely to form than when the ulcer was treated in the ordinary way. This, in the experience of the best ophthalmic surgeons, is a mistake. In my limited series of cases it certainly has never occurred that the resulting scar was greater than would have occurred had the cautery not been used; and I am strongly convinced that in every instance the scar was smaller than would have been the case had I not employed this agent. Touching this point, the following quotation from Fuchs[1] is *apropos:* "On the cauterized spot an opacity always remains, but as one cauterizes only that spot which without this would meet with the ulcerous disintegration, the final opacification on account of this will not be greater than it would have been in the first place." As I have just said, in the belief of many, it will not be as great.

In one example of central corneal ulcer going on to the formation of an abscess, after two cauterizations, in the second one of which I perforated the cornea, and in which cure took place in less than two weeks, although the original disease had been running on for several months in the form of a series of relapses, the ultimate vision was $\frac{20}{L}$ in spite of the nearly central situation of the disease. In the case of true herpes of the cornea, where a single application of a button cautery, very lightly applied, checked a process that began in September, and was active at the end of the following December, the result was only a faint diffuse haze over the centre of the pupillary space, which, by the correction of an astigmatism of a half dioptric, yielded a slightly clouded vision of $\frac{20}{XX}$. In a case of nearly central ulcer of the cornea with unhealthy margins, associated with phlyctenula around the margin, which had relapsed a number of times, in which the photophobia was very great, and the brow pain severe, and

[1] Lehrbuch der Augenheilkunde, p. 169.

in which good healing took place twenty days after the application, the resulting scar consists of a whitish band running diagonally across the pupil space, with a few old vessel channels traceable from it to the margin, and scattered through it several minute, white saturated spots, the vision is $\frac{20}{c}$, and one and one-half metre print can be read.

CONTRA-INDICATIONS.—In very extensive ulceration, involving a large area of the cornea, I would not use the actual cautery, certainly not until I had tried all other means, because, in order to make it effectual and to stop the sloughing process, the application would have to be so great as to lead to the possibility of an excessive reaction. It should be remembered, however, that in just such cases very good results have beeen obtained. I have had no personal experience. The actual cautery should not be applied to an ulcer which has already perforated, and to the margins of which the iris has become adherent. Some cases of this character are on record, in which a destructive inflammation, with subsequent loss of the eye, has been occasioned by the travelling back of the inflammation from the inflamed stump of the iris. The actual cautery does not seem to me to be indicated in those cases of hypopyon keratitis in which there is a large ulcer associated with a hypopyon that nearly fills the anterior chamber, and in which it can be demonstrated that the collection is exceedingly tenacious, having assumed the character of a slough. Here Saemisch's operation would seem to be the better; because, after its performance a delicate forceps can be introduced, and the offending material bodily removed, or it can be washed out, preferably with the admirable syringe devised by Lippincott, of Pittsburg. As Gruening aptly has said: "In these cases a combination of the two methods appears to be rational, for the actual cautery destroys the septic material of the cornea, and the Saemisch section removes the septic material from the anterior chamber." The actual cautery should not be used simply because there is a corneal ulcer. It is applicable especially to sloughing ulcers, to ulcers in which the spread of local infection is the dominant symptom, to ulcers which decline to heal under more moderate means, like the bichloride-of-mercury method, especially advocated by our fellow-member Dr. Jackson, the use of eserine, which has been ably insisted upon by Dr. Hansell, with whose conclusions I am in entire accord, or the use of milder cauterizations with solutions of nitrate of silver, or powdered iodoform, or scraping the base of the ulcer with a small curette. Touching the limitation of the suppurative process in sloughing ulcers, Mr. Brudenell Carter somewhat

enthusiastically says: "The most potent medicinal agent for the fulfilment of the first indication is eserine, which has been the means of saving numbers of eyes which without it must have perished."

Agreeing thoroughly with this author's estimate of the value of eserine, not only in sloughing ulcers, but in a host of other forms of corneal disease characterized by solutions in its continuity, we may say that in the event of the failure of this drug, and other well-recognized treatments, the actual cautery, in its power to limit suppurative processes, "has been the means of saving numbers of eyes," and with reasonably good vision, which without it might have perished.

DISCUSSION.

DR. EDWARD JACKSON: My experience with the actual cautery is comparatively small and somewhat removed in point of time. It is nearly four years since I last used it, though I recently had a case in which I seriously questioned whether I should not have used the actual cautery in addition to the Saemisch operation. I am convinced that heat is the only antiseptic which will penetrate as far as the tissue is involved in cases of corneal suppuration. But wherever it does penetrate to destroy the septic material, it also destroys corneal tissue; and my experience has been that scraping away of the softened surface, with some pressure on the deeper portions, a method of securing thorough drainage to the tissue, with the use of mercuric chloride solutions, have been sufficient to check the process in all cases in which I have tried it. Still there can be no doubt about the efficiency of the cautery. If but a single application can be made, it is probably the most certain means of arresting suppuration. Where, however, the case can be watched, the scraping repeated as soon as necessary, and constitutional treatment adopted, with the use of eserine, which certainly has an action on the nutrition of the cornea, I think that suppurating ulcers can be cured with at least as little subsequent opacity as with the cautery.

DR. CHARLES H. THOMAS: I have not employed the actual cautery, but I have found that thorough wiping of the ulcers and touching with the solid stick of nitrate of silver, have answered well. In the early stages the insufflation of calomel will do, but later something more decided is required.

DR. SAMUEL D. RISLEY: I have not used the actual cautery in the treatment of corneal ulcers; not, however, from any lack of confidence in its merits, since it receives the commendation of so many skilful observers. My treatment of this serious form of disease has been more conservative. It is probable that the cautery is useful as a rapid and effectual means of destroying the disease germs in the tissue. This I have sought to do by washing the ulcer thoroughly with moderately-strong solutions of bichloride of mercury, and following it with saturated solution of nitrate of silver, applied by means of a very small pledget of cotton on a fine-pointed cotton-carrier. By this

means the action of the silver upon the tissue can be confined to the desired area much better than when applied in the form of the solid stick.

Excellent results seem to follow this procedure, but I have frequently been sorely disappointed. Since hearing Dr. de Schweinitz's careful and interesting description of this dangerous form of eye disease, and the exceedingly good results following the use of the actual cautery in its treatment, I am resolved to resort to it in the future, and cannot but feel that in some of the disappointing results in the past the cautery might have secured a more favorable outcome.

DR. GEORGE E. DE SCHWEINITZ: The actual cautery should not be used, as a rule, until the ordinary and milder methods have been employed. In some instances, without the previous administration of other remedies, I have touched the point of ulceration with the actual cautery used as an active stimulant and very lightly applied, as, for instance, in the shallow central ulcers associated with chronic trachoma, and believe that under this treatment they have healed more rapidly than they would have done by other means. If the actual cautery is applied carefully, and not, as recommended in some text-books, beyond the edge of the ulcer and into the healthy tissue, and only that portion of the structure burnt which would be destroyed by the process of disease, there will be no more opacity of the cornea than if it had not been applied. In certain types of infecting ulcers, with a creeping tendency, it seems to me there should be no delay in the employment of this most potent remedy.

SEVERE PUERPERAL ECLAMPSIA—THE IMMEDIATE INDUCTION OF LABOR; RECOVERY.

By WILLIAM H. MORRISON, M.D.

[Read February 11, 1891.]

A BRIEF examination of the volumes of the *Transactions* of this Society for a number of years past, shows that among the varied subjects presented for discussion, that of puerperal convulsions has been wanting. It is especially important that in an affection like this, which in the majority of cases comes suddenly and without warning, the practitioner should have a definite idea as to the proper treatment, that he may be prepared to act promptly and efficiently. It is with the desire of bringing this subject before the profession, and with the hope of inciting a full and thorough discussion of the etiology and management of this serious malady, that a brief report of a recent case is presented.

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Mrs. X., æt. twenty-two years, married nine months, and pregnant for the first time, called on me January 1, 1891, with the request that I attend her in her confinement. She was pregnant seven and a half months, had been in perfect health and had not suffered with sick stomach or other ailments common to her condition. She stated that she had never felt better in her life until within a few weeks previously, when her kidneys had begun to trouble her. During the day she was obliged to pass water frequently and at night had to get up twenty or thirty times to urinate. The water passed was said to be thick and muddy. She brought a specimen with her, which on examination was found to contain one-half its bulk of albumin. Microscopical examination failed to reveal tube-casts. She was given a mixture containing tincture of digitalis and bromide of potassium, and requested to bring another specimen of urine in the course of a week. I might state at this point, that one or two years previously I had examined the urine of this patient and found it normal.

At six o'clock the following evening, January 2d, the mother of the patient came, stating that her daughter was suffering with headache and asked that something be given to relieve it. Five grains of antipyrine were ordered, with instructions to return in two hours if the headache were not better. At the same time, I told the mother that owing to the state of the kidneys there was

a possibility that convulsions might occur, and that if the condition of the urine did not speedily improve, the advisability of inducing premature labor would have to be considered. I heard nothing more from the patient until 2 A. M., eight hours later, when I was summoned with the statement that she had a convulsion. I found that she had had two severe general convulsions in which she had bitten her tongue, but when I saw her she was quiet and semi-conscious, and soon after roused sufficiently to recognize those about her. She was given ten grains of Dover's powder, which was swallowed readily. A specimen of the urine which had been passed at eleven o'clock the previous evening was secured and found to contain over one-half its bulk of albumin. I regret to say that the specific gravity was not noted. No tube-casts were found. At this time I informed the family that in the morning I would call Dr H. A. P. Neel, of Tacony, in consultation, and if he approved, would at once induce premature labor. To this proposition prompt consent was given. From this time until 8.30 A. M., when Dr. Neel saw her with me, she had at least four convulsions, and in the intervals there was a constant tendency to muscular twitching. Dr. Neel agreeing as to the propriety of bringing the pregnancy to an end as speedily as possible, the vagina was irrigated with a bichloride solution, and an English flexible catheter the openings of which were closed with wax, and which had been soaking for an hour in a bichloride solution, was introduced its entire length between the membranes and the wall of the uterus, care being taken not to rupture the membranes. The os was found dilated sufficiently to admit one finger, and the head was presenting. A bichloride tampon was then placed in the vagina. Two ounces of a dark, chocolate-colored urine were withdrawn with the catheter.

From this time the patient was under constant observation. There was a tendency to the recurrence of the convulsions, which were only prevented by the administration of ether. The anæsthetic was not given continuously, but only when the twitching of the eyelids, or of the muscles of the fingers, showed that a paroxysm was imminent. By this means the majority of the spasms were averted, although several did occur. While waiting for labor to begin, not having pilocarpine at hand, I injected ten minims of fluid extract of jaborandi hypodermatically, and in the course of thirty minutes injected twenty minims more. This produced free sweating and salivation. During this time the patient remained in a practically unconscious condition. About one hour after the introduction of the bougie, labor pains began to manifest themselves and were evidently felt, at least to a certain extent, by the patient, as was shown by her restlessness when the uterine contractions occurred. After the pains had continued an hour and a half, the vaginal tampon was removed and it was found that that the os had dilated to a diameter of two inches. The bougie was then removed and the vulvar orifice carefully dilated to an extent readily admitting the hand, and the os was stretched digitally until sufficient dilatation for the application of the forceps was secured. The membranes were then ruptured, the Hodge forceps applied and efforts at extraction cautiously made. The child was delivered without any tear of the cervix or of the perineum, five and one-half hours after the introduction of the catheter and three-fourths of an hour after the application of the

forceps. Although the labor was a comparatively easy one, and not of long duration, the child was dead and probably had died in some of the earlier convulsions. The uterus contracted well and the placenta was delivered without difficulty. During the labor no convulsions occurred, ether being given in sufficient quantity to quiet restlessness. Immediately after labor she had two spasms, apparently the result of the disturbance produced by removing soiled clothing and changing her position in bed. She then became much quieter; the muscular twitchings entirely ceased, and the use of the anæsthetic was suspended. The administration of chloral was now begun, first by the rectum, but as the patient swallowed readily and as the injections caused some irritation, it was later given by the mouth in fifteen-grain doses, repeated every two hours. In all, about seventy-five grains of chloral were administered. The patient was also given water in small quantities at short intervals.

The axillary temperature immediately after delivery was found to be 104.2°. Cold was therefore applied to the head and the body sponged with tepid water every half-hour. This was followed by a steady fall of temperature, until at midnight the normal had been reached. At 5 P.M., the catheter was introduced and an ounce of dark, thick urine withdrawn. The use of the catheter was followed by two convulsions. At this time ten minims of the tincture of digitalis were administered subcutaneously and the remedy continued by the mouth in five-drop doses every two hours. During the evening the convulsions recurred at intervals of two or three hours, occurring as a rule in groups of two, the last one appearing at midnight and being comparatively light. The free administration of water by the mouth was continued during the night.

The patient rested quietly through the night, without any twitching of the muscles, but did not regain consciousness. At 5 A. M. there was a copious discharge of urine in the bed. This was repeated twice during the day, but by evening she had regained consciousness sufficiently to use the bed-pan. Examination of the urine then passed showed that it contained one-sixth its bulk of albumin, but the microscope failed to reveal tube-casts. During the day (January 4th) she could be roused, and when spoken to would open her eyes, but not reply to questions. Skimmed milk was now given in small quantities frequently repeated, and the digitalis continued. The administration of chloral had been stopped the previous evening. Calomel in one-sixth grain doses was ordered to be repeated every hour until the bowels were freely moved. The mental power steadily improved until, by the evening of January 5th, she appreciated questions addressed to her, and replied to them intelligently, although the brain had evidently not yet resumed its normal condition. From this time forward the progress toward recovery was steady and rapid. The urine passed January 11th had a specific gravity of 1028, and contained one-fourth its bulk of albumin. No tube-casts were found, but there were many blood-corpuscles and it is probable that a large portion of the albumin was due to the admixture of blood from the uterus. Examination of urine passed January 19th showed specific gravity of 1020, and complete absence of albumin. February 10th, the urine had a specific gravity of 1028, an acid reaction, and contained no albumin.

Among the interesting features in this case are, (1) the sudden appearance of convulsions in a person who had been apparently perfectly well, with no evidence of nervous trouble until a few hours previously; (2) the almost complete suppression of urine for over twenty-four hours, no urine being passed from 11 P. M. Friday, until 5 A. M. Sunday, with the exception of three ounces withdrawn by the catheter; (3) the steady and rapid improvement that followed the emptying of the uterus. The total number of convulsions was between twenty and twenty-five, extending over a period of twenty-two hours.

The exact etiology of puerperal convulsions has not yet been positively determined. The majority of authorities agree that they are due to a toxæmia, the result of interference with the action of the kidneys, but the precise toxic agent has not been determined, nor has the manner in which the disturbance of the kidneys is brought about been agreed upon. Some hold that the interference with the function of the kidneys is due to pressure of the enlarged uterus upon the abdominal veins; others, that it is due to pressure upon the kidneys themselves, or upon the ureters; while in a recent paper[1] Dr. James Tyson advocates the view that this interference is the result "of the irritant effect upon the renal cells of some toxic substance in the blood, the precise nature of which is unknown, but which probably represents excrementitious substances from the mother and fœtus." Whether we accept the view advocated by King, that the renal congestion and inflammation is the result of pressure upon the inferior vena cava and iliac veins, or that of Halbertsma, that it is due to pressure upon the ureters, or that of Tyson, that it is due to the presence of excrementitious matters from the mother and fœtus, we find that in each of these theories, an essential factor in the production of the renal derangement is the presence of the fœtus. Therefore, the primary indication in the treatment of puerperal convulsions prior to delivery, is the speedy termination of pregnancy. While, by venesection, the administration of ether, chloroform, chloral, veratrum viride, and the like, we may control the paroxysms, it is only by the removal of the cause which has produced and is continuing the renal congestion and inflammation that we can expect to restore the functional activity of the kidneys on which depends our only ground of hope of removing the deleterious matters circulating in the blood. Where the convulsions occur after the period of viability, this treatment also affords the

[1] New York Medical Record, January 3, 1891.

best chance of saving the life of the child, for it is generally admitted that, as a rule, death of the fœtus occurs early in the attack.

While measures calculated to induce labor are practised, the convulsions should be controlled as far as possible by the use of ether, chloroform, chloral, veratrum viride, and similar agents. The action of the kidneys should be encouraged by the free administration of water by the mouth or rectum, and the renal function should be supplemented by free diaphoresis and catharsis.

In considering the treatment of these severe cases, one other point presents itself. What shall be done where the case is desperate, and where contractions of the uterus are not readily induced? It seems to me that where the effect of the poison on the system is profound, where the convulsions are violent and frequent, where the suppression of urine is practically complete, where there is no prospect of the rapid induction of labor, or where the efforts to bring on labor excite convulsions, the question of removal of the fœtus by abdominal section should be seriously considered. Such a course would in a few minutes remove an important causative factor in the production of the disease, afford a better opportunity for the action of remedies intended to control the paroxysms, to stimulate the action of the kidney and to favor the excretion of poisonous matters, and probably give, both to the mother and to the child, the best chance for life.

DISCUSSION.

DR. REYNOLDS WILSON: I wish to say but a word, and that is with reference to the use of morphia in the treatment of puerperal convulsions. I recently had the opportunity of seeing a typical case of eclampsia treated in this way in the clinic of Professor Winckel. The patient, a primipara, supposed to be at the eighth month, was admitted to the hospital in a delirious and semi-comatose condition at 9 P.M.; between this time and 4 A.M., she had four convulsions. She was treated with large doses of morphine by hypodermic injections. Chloroform was also used. When first admitted, the os would admit two fingers. At 2 P.M. labor came on, the second stage lasting only half an hour. The child was living, and lived for thirty hours. Professor Winckel advocates and practises the hypodermic injection of morphia in these cases, in doses of half a grain, repeated in from four to seven hours, and continued until three grains in all have been given.

DR. WILLIAM S. STEWART: I was much interested in the paper, and especially in the description of the treatment of this particular case. I, however, rather feel like taking exception to the suggestion made in the latter part of the paper—that is, in regard to the performance of abdominal section.

I think that it is possible to control these convulsions by large doses of chloral, given at first by the rectum and afterward by the mouth, if that can be done. I have had a number of cases of puerperal convulsions, and have had no difficulty in controlling them since I have learned that a certain dose of chloral will control the convulsions for a specific time. One drachm of chloral injected into the rectum will control the convulsions for about one hour and a half, almost to the minute. At the end of that time I am prepared to repeat the injection, if necessary. That quantity of chloral will control the convulsions in ten seconds. The effect of the injection is to produce profound sleep.

I have also experimented with the use of chloral in the albuminuria of the pregnant state. I had to remain in the city one entire summer, on account of one case where the family were so obstinate that they would not permit me to bring on premature labor when the child was viable. The patient was a primipara, with almost complete suppression of urine. The albumin was so abundant that the urine coagulated into an almost solid mass on boiling. I predicted convulsions, and insisted on bringing on labor, but to this the mother would not consent. I tried various remedies, with no effect upon the action of the kidneys. She began to have feelings of twitching, etc., and I put her on small doses of chloral. To my astonishment the albuminuria began to diminish, and the quantity of urine was increased. Her condition steadily improved, and I succeeded in getting her through without a convulsion.

In my first experience with puerperal convulsions, fifteen or twenty years ago, I used morphine by hypodermic injection; but when I recall the difficulty I had in bringing this patient through, and the severe injuries to the tongue, which did not heal for weeks, I consider this a poor method, although it is recommended by so high an authority as Winckel.

DR. WILLIAM H. WELCH: I do not propose to take up the time of the Society, but I want to mention that not long ago I came across one of these cases. Chloral was employed very freely, and during the convulsions chloroform was admiuistered, and delivery accomplished with the forceps as speedily as possible. In spite of all that could be done, the patient rapidly became comatose and died. I think that in this case chloral was used as freely as was safe. This is an instance where chloral did not save the patient.

THE CONSTRUCTION AND ADAPTATION OF SPECTACLE-FRAMES.

By CHARLES HERMON THOMAS, M.D.

[Read February 11, 1891.]

The treatment of ocular defects by means of glasses involves, beside the optical correction, a factor of no less practical importance—their mechanical adjustment. The purpose of the present paper is to direct attention to some of the mechanical aspects of the subject, particularly to the principles involved, and to certain methods of mounting spectacle-glasses.

The results of the most accurate refractive measurements may be entirely vitiated by a faulty position of the correcting glasses; not only so, but new sources of eye-strain may be created by the very means adopted to remove an existing fault. Correcting glasses are remedial agents, just as orthopædic appliances are, and, as such, are powerful for evil as well as good; and hence everything belonging to them falls within the supervision of the prescribing physician.

The optical centre of a lens is generally that part of the glass which we wish to bring before the pupil, as that part of the lens and the area immediately surrounding it are freest from aberrations of all sorts—distort the least. Occasionally, however, it may be desirable to displace this point by a definite amount; in any case, we should insist on having the optician carry out our directions as regards the manner of mounting and the position of the glass with the same exactness that he employs in making it of the proper strength.

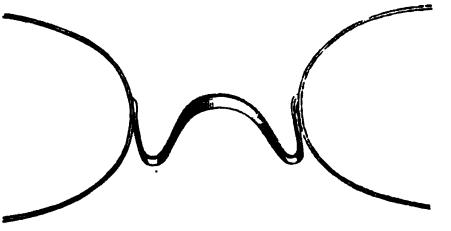
The purpose of the spectacle-frame is to hold a pair of glasses before the eyes in a definite position and with the least possible annoyance to the wearer. To accomplish this, I devised a plan about thirteen years ago (1878) for the construction of spectacle-bridges, which plan provides especially for a wide range of adaptability and the consequent accurate adaptation of spectacles to individual faces of almost every conceivable form. No account of the principles involved

has heretofore been published, so far as is known, although some special forms of the bridge, as originally made under my direction, have come into almost universal use, being known throughout the optical trade under the name **saddle-bridge.**

Previous to the introduction of this bridge it was not practicable to obtain spectacle-frames suitable for persons with unusual forms of nose or face or with excessively prominent eyes or long lashes. Then, beside the ordinary "regular bridge," there was nothing better in use than the "X-bridge" or the equally unsatisfactory "snake-bridge," in both of which the combined weight of the glasses and frames was often borne directly upon the crest of the nose, besides which they usually failed to place the glasses in the correct position before the eyes. Few could wear either of the latter with comfort, and those who succeeded often did so only by padding them with wrappings of thread, thus making an unsightly cushion at the point of contact with the nose.

The bridge (Fig. 1) under the plan referred to consists of (1) a nose-piece of arched form, of flattened wire, and made to conform

FIG. 1.



Saddle-bridge—typical form (back view).

accurately to the shape of the nose at a definite point of selection, crossing the bridge of the nose at right angles and so resting saddle-wise upon it—whence its name. (2) A pair of adjustable return-pieces or arms, to the extremities of which are attached the rims or clasps carrying the glasses. These arms are produced by bending outward upon themselves the limbs of the wire from which the arch of the bridge has been formed, and are given whatever special direction may be required to place the glasses in the desired position before the eyes of the individual wearer.

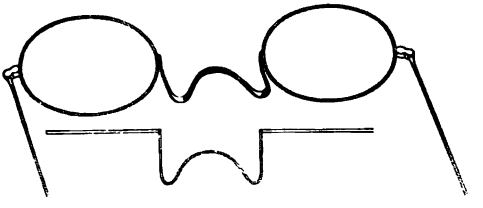
The bridge consists, then, of an arch and two adjustable arms, which,

while fixing the glasses in their proper position before the eyes, should furnish a support as nearly immovable as possible.

The bridge of the nose close to its root being the basis of support, the spectacle-bridge must be constructed with reference to this part. The wire of which it is made should be wide at the middle and taper toward each end, so as to make the bridge widest where it takes its bearing on the sensitive part of the crest of the nose. Narrowing the extremities is of special advantage, as it facilitates any necessary bending at that point in the process of adjustment. The sides of the arch should embrace the nose snugly without undue pressure, and extend well back toward the inner canthus, but not far enough to press upon the lachrymal sac. The saddle, or arch, as thus described, becomes the fixed support when it rests in its proper position. This position varies considerably in different persons, though on every nose there is usually one best point which should be sought—the **point of selection**, it may be termed. Unless the arch be adjusted to this particular point, the wearer will be rendered uncomfortable, and be continually shifting his spectacles. A few days' wear may be required to determine this point definitely in a particular case.

The arch of the bridge, when once adapted to the nose, is not to be altered in position during any subsequent regulation or adjustment which may be required; it is to be considered as a definitely fixed support, whose situation is determined, once for all, by the conformation of the wearer's nose. Hence the position which the lenses are to take before the eyes does not directly depend upon the arch, but rather upon the length and direction of the adjustable arms attached

FIG. 2.

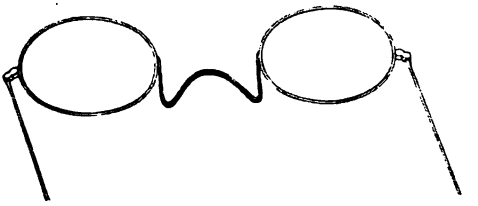


Saddle-bridge, with horizontal arms; for prominent eyes and long lashes.

to it, by variations in which the glasses may be made to take any required position. The arms are to be made long or short, they may be set high or low, pointed inward or outward, according to the requirements of any given case.

If the eyes be specially prominent, and the bridge of the nose be low, thus causing the lashes to project beyond the level of the nose, the arms must be made relatively long (Fig. 2); or if the bridge of the nose be low or flat, and the eyes be placed relatively high, it may be required to direct the arms perpendicularly upward (Fig. 3); or,

Fig. 3.



Saddle-bridge, with vertical arms; for flattened nose, eyes high.

again, if the bridge of the nose be prominent, and the eyes sunken, the arms should be shortened, or even reduced to the minimum required for purposes of lateral and vertical adjustment.

The height of the eye as related to the part of the nose on which the arch rests—the point of selection—determines the amount of slant, if any, to be given to the arms. In practice it is found that in by far the larger proportion of cases the arms are nearly horizontal, slanting slightly upward; in exceptional cases they slant downward below the horizontal; and in rare instances it is necessary to give them an almost perpendicular direction upward. The angle which the arms make with the clamp or rim carrying the glasses must vary according to the direction of the arms, in order to keep the plane of the glasses perpendicular to the visual lines. The arm, where it is soldered to the rim, or the clasp of frameless glasses, is slightly bent in an upward direction. Increasing or diminishing these curves changes the position of the glasses vertically, and so compensates for any degree of upward or downward slant of the arms. This may be necessary where, for example, the point of selection of the arch is low down on the nose; the arms must then ascend vertically to raise the glasses to a level with the eyes; but this position of the arms will cause the glasses to assume an approximately horizontal direction—parallel to the visual lines—if the arms meet the rim at or about a right angle, as they usually do; in such a case, the arm must be bent so as to join the lens at an oblique angle or even lie in the plane of the lens.

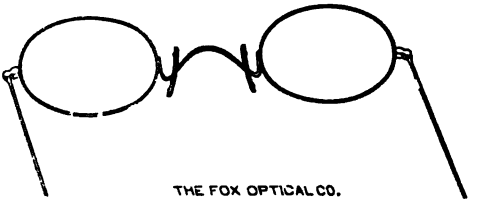
The proper adjustment of a pair of spectacles in ordinary cases is

largely determined, as we have seen, by the length and direction of the arms. In special cases, also, as in asymmetry of the face, the compensation required is to be effected by the same means. In some cases the arms may need to be of unequal length. It is of frequent occurrence that the centres of the pupils on the two sides are unequally distant from the centre of the arch. When this condition exists it is to be met by varying the direction, and, it may be, also the length, of the arms.

It is important from the point of view of the optician, to note that the principal adaptations of the bridge are preferably to be made extemporaneously and with the patient present. In this way, with a variety of sizes of the typical form at hand, the skilful mechanic is able to produce any particular modification which may be required without specially constructing the frames, even for atypical faces. It is often desirable to take the conformation of the nose at the point of selection. This may conveniently be done with lead wire, and the "rubbed" transfer outline thus obtained be made a part of the record of the case.

Variations in the size of the lenses employed will also necessitate modifications in the lateral adjustment of the arms. To get the advantages of a large glass in cases where the distance between the eyes is relatively small, the arms will have to be bent inward—made to approach each other. The opposite direction may have to be given them in cases of unusual width of face.

FIG. 4.



Saddle-bridge, with clamps.

Lateral supports, or clamps, which take their bearing lengthwise on the sides of the nose near the base, as in eye-glasses of the best construction, have occasionally been employed by others in combination with spectacle-frames, but usually in form and by mechanical means not wholly satisfactory.

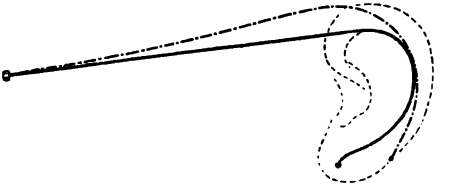
I have recently had made by the Fox Optical Company a combi-

nation of the eye-glass clamps with the saddle-bridge (Fig. 4), which is neat and simple in construction, and which combines the advantages of both in great degree. The attachment is so made as to preserve the adjustability both of the bridge and the clamps. The special advantage of this combination is that it **distributes the pressure** over a larger surface, and upon parts better able to sustain it than does the arch of the bridge alone.

The side-pieces, or **temples**, should be **specially adapted** to the ear with as much care as the bridge is to the nose in each individual case. They should be hooked around the ears for constant use, and be so formed as to retain the bridge at the point of selection on the nose, and thus secure a fixed position of the entire appliance. The curve of temples, as ordinarily made, is of far too great a radius. It takes its bearing behind the ear upon a limited surface, and so is liable to cut; it fails to secure a proper hold to prevent its riding upward, and it often exerts spring-pressure productive of pain and injurious to ears and nose alike.

An **adapted temple**, designed to fulfil the above indications and obviate these defects, has recently been constructed under my directions, and has borne the test of use so well as to justify its continued regular employment (Fig. 5). The wire of which it is made

FIG. 5.



Adapted temple.

passes back in a **straight line** to the top of the ear, at which point it is bent somewhat abruptly downward, and is made to conform accurately to the posterior surface of the conch close to its junction with the head, where it rests in contact with the ear, but without perceptible pressure. Asymmetry in the height of the ears, causing **tilting of the frames from the level**, is to be met by a compensating adjustment in the temples, *i. e.*, bending the temple upward on the side of the higher or downward on the side of the lower ear—or both—and so dividing the result between the two sides. The glasses should be slightly inclined from the perpendicular, so as to bring the

lower edges somewhat nearer the face than the upper, which is to be effected by giving the temples the appropriate angulation at their junction with the hinges when it is impracticable to change the direction of the hinges themselves.

The material of the frames should usually be gold of a good quality and of a weight as light as is consistent with strength and steadiness. Steel rusts too readily and is not well adapted to the adjustments frequently required—more especially in the temples. Silver is so soft as to be almost worthless. The lenses themselves should usually be as large as the face of the wearer permits: seldom less than 28x38 mm. for an adult, and not infrequently as large as 29x40 or 30x42 mm., in order that the eyes may be well covered in their ordinary lateral movements. Such large lenses are hardly more conspicuous than small ones—especially if frameless glasses be used—because they allow the eye itself to be easily seen. The reflections from the edges of frameless glasses which are so annoying to some persons may be avoided by slightly dulling the polish on the lower edge; the source of this reflected light being usually at or above the level of the eyes, the reflection enters the eye from this edge alone.

The glasses should be worn as close to the eyes as possible, without touching the lashes. Occasionally, where the lashes are especially long, with feathery or uneven ends, they should be neatly trimmed with the scissors—a little procedure best practised when the eyes are closed.

It is also to be borne in mind that the subject has an artistic aspect, and that by giving proper consideration to this phase much can be done to remove the opprobrium which frequently attaches to the wearing of glasses. The neat adjustment of a pair of frameless gold-mounted spectacles is doubtless the best that can be accomplished with spectacles in this respect.

In the above, it will be seen, I have limited myself to a description of no one form of bridge, nor even of a number of special forms, but the effort has been made rather to demonstrate *the mechanical principles involved in the construction and adaptation of spectacle-frames suitable to all the requirements of practice.* By the means proposed it is practicable to secure the correct position of the glasses before the eyes, together with comfort to the wearer and a satisfactory artistic effect, thus fulfilling the three principal indications of spectacle-mounting.

DISCUSSION.

DR. EDWARD JACKSON: One of the difficulties I have met with in having opticians fit frames, and in making students understand how frames should fit, is in regard to the location of this "point of selection," to which Dr. Thomas refers. It is not any point arbitrarily chosen, but is, in each case, rigidly determined by the form of the face. To it the traction of the temples constantly tends to bring the bridge. The bridge placed above it is drawn down, or below it is drawn up, toward it and comes to rest upon it.

A point which has recently come to my notice in fitting frames is that the plane of the temples must pass through that part of the surface of the bridge that bears upon the nose. If it passes above or below this it tends to tilt the bridge, so that its edge bears on the nose instead of the flat surface. To effect the proper position it will sometimes be needful to attach the bridge and the joint for the temple, not at opposite extremities of the horizontal diameter of the lens ellipse, but at the extremities of a shorter chord lying above or below this diameter.

DR. GEORGE M. GOULD: I wish to speak on one point brought up by Dr. Thomas, and that is, the reflection from the edge of rimless glasses. I have had patients who could not wear glasses on account of the annoyance caused by this reflection. Last year, in *Knapp's Archives*, I described a little device of my friend Dr. Rhoads by which the edge of the glass was bevelled on a plane with the pupil. In this way all reflection is avoided. The only objection is that this exaggerates the reflection to the beholder.

In reference to the effects of pressure of the bridge on the nose, I had a case last week which brought a new phase of this matter before me. A couple of months ago I applied glasses to a patient with specific rhinitis. Following this the nose ulcerated near the point of pressure, and several pieces of bone were discharged. I do not think that it was due altogether to misfitting of the frame, but principally to the fact that the skin was so sensitive that the least pressure caused trouble. It, however, gave me a lesson not to apply glasses in specific rhinitis in an acute stage.

The whole of the paper of Dr. Thomas is a corollary to the great fact that the optician should be an educated mechanic. The optician stands in the same relation to the oculist that the druggist stands to the physician. Until the optician learns to take a pride in his profession we shall not have well-fitting glasses, unless we are constantly on the watch. We should, therefore, do all that we can to elevate and encourage the dignity of the optician's profession.

DR. THOMAS: I am especially pleased with the suggestion of Dr. Jackson in regard to the line of draught and the location of the temples. I think that there are cases in which this may have considerable practical importance and that, therefore, it should be taken into account.

FURTHER REPORT ON A CASE OF MULTIPLE SARCOMATA IN A CHILD.

By FREDERICK A. PACKARD, M.D.

[Read February 11, 1891.]

Some of the members of the Society, present this evening, may have also attended the meeting last spring, when I showed a little patient suffering from multiple sarcomata.

The child has since then died, and I wish to-night to report upon the further course of the case, and to show the specimens obtained at the autopsy.

In order to refresh the memory of those who were present at the former meeting, and to give a brief account of the course of the case for the benefit of those who did not see it during life, I may be pardoned if I again read, in brief, however, portions of my previous report:

The child was white, a male, and, at the time of first coming under observation, was six months old. There was nothing in the family history that had any bearing upon the condition of the child.

He was born at full term. Ever since birth he has been fretful, and seemed uneasy. At the age of seven or eight weeks his mother noticed two or three small lumps growing upon the child's back. These were, when first seen, of about the size of a pea, and of a purplish color. Other tumors rapidly appeared upon the head and sides of the trunk. These steadily increased in size, while new growths rapidly appeared, the last being upon the soles of the feet. They never diminished in size, but have been gradually growing larger. There had been no marked tenderness connected with them.

The child's legs had always seemed weak, and were never moved so freely or forcibly as the arms. The child had always nursed well, and there seemed to be no trouble with deglutition. Vomiting occurred but seldom.

About a month before coming under observation he was thought to have cought cold, having had difficulty in breathing. This difficulty persisted until he was first seen by me. There had been no œdema.

The child was thin and old-looking. Scattered over the head were numerous firm, well-defined tumors, not adherent to the skin, and freely movable.

They were of a purplish tint. Over the whole trunk and limbs were growths similar in appearance, but some of them of larger size. These followed no definite arrangement, and varied in size from that of a pea to that of a pullet-egg.

There was marked dyspnœa with upward and downward movement of the thyroid with respiration, while the whole thorax was moved upward, and its base contracted during inspiration. The cry was slightly hoarse.

The chest was increased in its antero-posterior diameter, its circumference at the horizontal nipple line-being sixteen inches. There was no unilateral or local bulging. Percussion showed a slightly lessened degree of pulmonary resonance in the interscapular region, but there was no decided dulness. Unaltered breath-sounds were everywhere distinctly heard. The heart-examination was negative. The pulse at the wrists was equal on the two sides.

The pupils were normal and equal, reacting well to light. There was no strabismus. The eye-grounds could not be viewed. There was apparently no impairment of vision or hearing.

The legs were but feebly and seldom moved. The knee-jerk was exaggerated equally. No clonus was present.

The bladder and rectum were retentive.

No alteration in sensation was discoverable, and there was no apparent local wasting, although the legs were thin and flabby.

Examination of the blood revealed a slight degree of anæmia, with no increase of white cells.

A small tumor was excised from the abdominal wall, and submitted to microscopic examination, which showed it to be a small round-celled sarcoma.

The child was shown to the Society at the meeting of March 26, 1890. From that time there was no marked change, except for slowly increasing dyspnœa until April 15th, when I was hurriedly summoned to see the child. I found it cyanosed, with greatly labored inspiration and some paroxysmal struggling for breath. The breath-sounds were extremely feeble, especially posteriorly, where also there was marked dulness. The dyspnœa steadily increased until the evening of the following day (April 16), when the child died from asphyxia.

The following notes were taken at the autopsy, which was made thirty-six hours after death:

The body is emaciated, there being but little subcutaneous fat.

The dome of the *diaphragm* was, on the right side, at the fourth interspace on the left at the sixth rib. There was a very slight amount of clear serum in the abdominal cavity.

Retro-peritoneal lymph-glands normal. Two enlarged glands lie near the promontory of the sacrum.

On opening the chest the *thymus gland* is found to be large, covering the pericardium over almost two-thirds of its anterior surface in the median line. The gland is fully three inches long by one and three-quarters inches wide. It reached down to the level of the sixth rib. Its color is more of a leaden

hue than is normal; its lobes are distinctly marked, and in places there is a distinct feeling of induration in areas not larger than a buckshot. On section of one of these indurated portions it is found to be of a deep slate color, firm, homogeneous in appearance, and, while snugly imbedded in gland tissue, does not shade off into healthy substance. The gland was not adherent to neighboring parts save by the normal amount of fine connective tissue.

The *pericardium* contained a little clear serum. Pericardial tissues normal.

The *heart* is of a good color, and its surface is smooth. The left ventricle is firmly contracted. There is no manifest alteration in the size of the heart cavities, but the wall of the left ventricle is slightly increased in thickness. Both ventricles contained *post-mortem* clots, that in the right being pale and firm, and extending into the pulmonary artery. All of the valve leaflets are normal.

The *phrenic nerves* were uninvolved, being clearly seen throughout their whole course to the diaphragm.

Both *lungs* were partially collapsed. Anteriorly and laterally there were no pleural adhesions, but posteriorly on both sides the fingers came in contact with a hard, firm mass, tightly adherent to the inner surfaces of the ribs close to their heads and to the bodies of the vertebræ. The lungs themselves are of a mottled appearance, owing to light elevated patches of crepitatant lung and liver-colored depressed areas of non-crepitant tissue. The liver-colored portions sink in water.

In the visceral *pleuræ* are two or three small fat-colored masses of about 4 mm. diameter, freely movable with the pleural membrane, and not apparently involving the lung parenchyma. Except for the atelectasis, which is most marked near the edges, the lungs show to the naked eye no pathological alteration.

The *œsophagus* is free from involvement, although in immediate contact posteriorly with the hard mass described below.

The arch of the *aorta* is free and its lumen unaffected. From it spring the usual number of arteries, likewise uninvolved. The descending portion of the arch and the thoracic aorta are seen running in a fissure between two lobes of the tumor mass, the exposed portion facing anteriorly and to the left. The growth almost surrounds the descending aorta behind, to its inner side, to its outer side, and from the latter point partly covering-in its anterior arc. On slitting up the aorta along the exposed surface the openings of the intercostal arteries are seen, the arteries themselves running directly into the tumor mass.

The *pneumogastric nerves* are free throughout their whole length, running down in front of the mass. The right recurrent laryngeal nerve could not be found; the left wound around the arch of the aorta, and was found to be free from involvement or pressure in its course up the trachea to the point of section above.

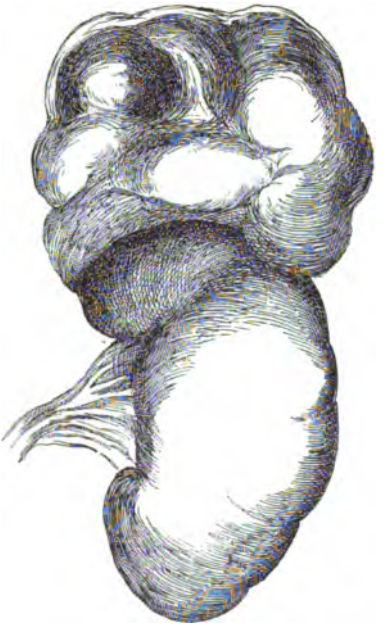
The *tumor masses* in the thorax are agglutinated together, but have distinct lobules. They are firm, almost cartilaginous, and of a deep purplish color, but faintly mottled with lighter red. The mass, as a whole, saddled the bodies of the vertebræ, from which it had to be forcibly separated. The whole tumor mass is of about the size of a large halved orange. On section the tissue is found to be very tough, and on the cut surface shows in large areas what

appears to be either hemorrhagic degeneration or deep melanosis. The bodies of the vertebræ were not eroded or softened, being perfectly normal in appearance. There was marked lateral deviation of the spine, the convexity being toward the right. The parietal pleura was smooth and normal in appearance. The antero-posteror diameter of the chest at its deepest part measured 78 mm. Springing from the ribs near to their angle (on the thoracic surface) were some sharp exostoses of a dark color, about which portions of the growth adhered on removal of the mass.

The *peritoneum* was normal, the organs of the abdominal cavity being in their normal position.

Vermiform process normal in appearance, about 4.5 cm. in length, and situated entirely back of the caput coli.

FIG. 1.



Left supra-renal capsule and kidney, showing bosses of sarcomatous growth.

Mesenteric glands uninvolved.

Spleen large, firm and dark in color. Section shows nothing abnormal; surface smooth and glistening.

Ureters and *bladder* normal.

Testicles descended and not enlarged or indurated.

Left *supra-renal capsule* is larger than an ordinary English walnut, firm, lobulated, and of a generally rounded outline. It is of a purplish color, except for a narrow rim of greenish-yellow granular tissue that is evidently the cortical portion of the adrenal. (See Fig. 1.) The right supra-renal capsule is smaller than the left, but has otherwise the same characteristics. On

section a thin rim of cortex is seen, with slate-colored firm masses in the interior. (Fig. 2.)

The *kidneys* are normal, except for distortion of their general shape and flattening of their superior extremities.

The *pancreas* is itself normal, but just at its tip is an enlarged yellowish gland.

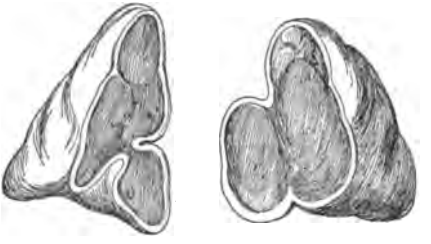
Stomach and *intestines* normal.

Bile-duct patulous.

The *gall-bladder* contained a fair quantity of fluid bile. At each end of the viscus was a whitish nodule.

Liver is large. In the notch are seen two enlarged hard nodules of a white color, and resembling in appearance lymphatic glands. On the surface of the liver are seen numerous dark, slightly elevated areas, showing on section

FIG. 2.



Transverse sections of two portions of right supra-renal capsule, showing sarcomatous infiltration of medullary portion.

a slate color, distinctly demarcated from the liver tissue. The parenchyma of the organ is of normal appearance, but scattered throughout various parts of it there are isolated white or slate-colored foci, varying in size from that of a small to that of a large pea.

Diaphragm normal.

Owing to the almost constant presence of the child's father, but a small portion of the spinal cord could be removed, and in order to obtain the part most likely to indicate any spinal involvement by secondary changes, the lower dorsal and lumbar segment was removed. This showed to the naked eye nothing abnormal. The brain was not examined.

Microscopic examination of the various growths reveals the structure of *lympho-sarcoma* in all. The sections show numberless small, round lymphoid cells, staining brilliantly with borax-carmine.

In the section from the posterior mediastinal growth there are two clearly-defined areas, one composed of a delicate reticulum, enclosing and closely associated with innumerable lymphoid round cells, the other consisting of massed, red blood-corpuscles, in more or less advanced stages of degeneration, with a few brightly staining lymphoid cells scattered about irregularly. In other portions there is an intermediate

condition. Throughout the section are seen very many thin-walled capillaries; at one portion the collection of round cells is intersected by numerous connective tissue bands.

The nodule from the thymus gland is made up of a similar tissue, without hemorrhagic admixture, while in addition there are scattered among the lymphoid cells, bodies that appear to be remnants of Hassel's concentric corpuscles. There is apparently some faint attempt at separation between the tumor and normal thymus tissue, as shown by a fragmentary connective tissue layer, seen at some places between the normal and abnormal cells.

The sections of lung were cut from a block so removed as to include one of the pleural growths. The pleural surface is thickened in the neighborhood of the growth, and beneath it there is seen a mass of brightly-staining round cells having the same general arrangement as

FIG. 3.

Section of lung, showing polypoid mass projecting into an alveolus (HARTNACK, oc. iii. obj. 5). Reproduced on small scale.

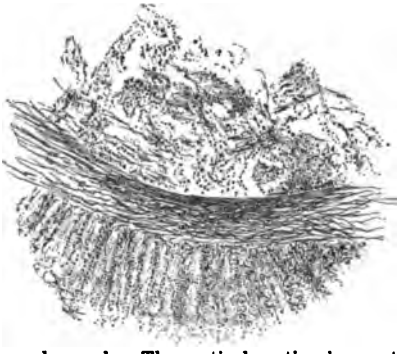
described above. The whole alveolar structure of the lung has a coarse, heavy appearance when viewed under a low power. This is found to be due to universal infiltration of the alveolar walls with tumor cells. Some of the alveoli contain a few exudation cells, while in others masses of tumor cells are to be seen, either lying loose within the space (evidently from the plane of section), or springing from the alveolar wall itself. In a few of the alveoli the tumor cells can be seen invading or pushing through the alveolar wall and projecting as polypoid masses into the alveolar space. This is shown in Fig. 3, which is somewhat diagrammatic, where the cell mass is seen covering-in a vessel containing an old clot, and widening out as it enters the alveolus. All of the bloodvessels in this section were filled with blood.

In the liver the parenchyma cells lying near the tumor nodule are poorly outlined, crowded together, and take the stain (borax-carmine)

badly. There is much connective tissue within the tumor area, among the meshes of which are scattered masses of the same brightly staining cells as occur in the other organs. Here there are, in addition, many very minute, brightly staining round cells, such as are not seen in other nodules, and which are about one-half the size of the more predominant cells.

The supra-renal capsule (the left only being examined microscopically) consists of two distinct portions (Fig. 4), an outer, dense-looking, narrow rim, enclosing a spongy-looking material, taking a deeper stain. The outer layer, under higher power, is seen to be the normal cortical substance of the capsule. This is separated by a wide band of connective tissue from a loosely arranged collection of brightly staining small round cells of a somewhat alveolar grouping, and

FIG. 4.



Section of right supra-renal capsule. The cortical portion is seen to be separated from the sarcomatous tissue by a broad band of connective tissue (HARTNACK, oc. iii. obj. 3). Reproduced on small scale.

intersected by numerous lines of fusiform cells in single rows or strands. A moderate number of thin-walled bloodvessels run through the masses of mingled cells and loose connective tissue. In a few places the lymphoid cells have somewhat the general radiating arrangement of the cortical layer.

On taking into consideration the much larger size of the mass in the posterior mediastinum, as compared with the nodules elsewhere found, as well as on thinking of the fact that the only growth that had taken on any degenerative change was in that mass, the primary seat of trouble would seem to be at that point.

On looking over the records of previously reported cases of tumor of the posterior mediastinum, one is struck with the extreme latency of even large growths in that situation; it is probable, therefore, that

this was in fact the origin of the other tumors, yet I cannot help thinking it possible, in view of the early age at which the growths were first noticed beneath the skin, that the whole cell organization of the child may have been at fault, and that, instead of the nodules scattered so profusely in such diverse organs of the body being secondary to any one primary growth, they were all merely a part of such perverted formation. This suggestion, I admit, is in the highest degree theoretical, but I should be glad to hear expressed the views of the members as to its probable value.

After an exhaustive search through all of the reported cases of mediastinal tumors I have found but a single case occurring at so early an age as the one now reported. This case was reported by Charon and Ledeganck[1] in 1878, as "a case of congenital sarcoma of the face, with miliary tumors of embryonal connective tissue in subcutaneous tissues, pleura, mediastinum, and pericardium," the child dying on the twentieth day. Whether this case was sarcoma or not is not clearly stated, but it probably was so. The next youngest previously reported case that I could discover is one shown by Angel Money[2] to the London Pathological Society in November, 1888. In brief, this was from a child who began to lose flesh at the age of six months, cough with dyspnœa and cyanosis appearing six months later. At the autopsy there was found a round-celled sarcoma in the posterior mediastinal space, no other nodules being found in the body.

Out of the forty-eight cases of mediastinal sarcoma, collected by Hare in his Fothergillian prize essay, none occurred in children under five years of age.

Jacobs,[3] in 1873, showed to the New York Pathological Society a mediastinal sarcomatous tumor, removed from a child aged four years, where no metastasis had occurred. Douglas Powell[4] says, that out of six cases seen by him, the youngest was six years old, while Hertz[5] states that Eger, in fifty-five cases, found but one below the age of ten years (precise age not given).

While numerous cases of congenital primary sarcoma of the suprarenal capsules have been reported, I have been unable, in any case, either in adult or child, to find one recorded case of mediastinal sarcoma with metastasis to that organ. Secondary sarcoma of the

[1] Bull. de l'Acad. Roy. de Méd. de Belgique, 1878, t. xii. p. 548.
[2] British Medical Journal, Nov. 10, 1888.
[3] New York Medical Record, April 1, 1873.
[4] Reynolds's System of Medicine.
[5] Ziemssen's Cyclopædia of the Practice of Medicine.

adrenals would seem, from my investigation, to be rare, the only case that I found in a somewhat superficial search for records of secondary sarcoma of those organs being one reported by Buttin[1] as a case of subperiosteal spindle-celled sarcoma with metastasis to the supra-renal capsules.

Recently I have read in one of the journals a report of a society's proceedings, in which many cases of primary congenital sarcoma of the adrenals were reported. Although I made a note of this fact, I very carelessly neglected to attach the name of the journal in which it occurred, nor have I been able to find it again.

Finally, I must express my regret at not having seen, before the death of this child, the account of a case reported by Dr. Heinrich Köbner,[2] of an eight-and-a-half-year-old child, with multiple subcutaneous spindle-celled sarcomata, a cure having been obtained by the bold use of Fowler's solution of arsenic by hypodermic injection. Had I heard of it in time I should have certainly tried the method in this otherwise hopelessly fatal case.

DISCUSSION.

DR. GEORGE E. DE SCHWEINITZ: I have never seen multiple sarcoma in a child so young as the one whose case has been so admirably reported to-night. Some years ago I described to this Society a case of multiple sarcomata in an adult, the primary growth having occurred at the lower angle of the scapula, of the round-celled variety, the multiple growths having begun to appear some two years after its removal. Arsenic was given to this man, not by hypodermic injection, but in the form of Fowler's solution, and at times as Donovan's solution. Many of the growths were so situated that they could be moved freely under the skin, and it was believed that there was a diminution in the size of some of them under this treatment. One tumor on the inner size of the thigh disappeared, but, in my belief, this was a lymphatic gland, enlarged, but not the seat of sarcomatous growth. The patient was under the care of Dr. Pepper in the wards of the University Hospital. Among the many interesting features seen with this patient were symptoms indicating spinal disease—nearly absent reflexes, marked wasting in the calves of the legs, a peculiar gait, and, finally, complete loss of power in the lower extremities. At the autopsy more than two hundred tumors were found, taken from every organ in the body with the exception of the brain and spinal cord. The loss of power was probably due to the presence of hard tumorous masses pressing upon the nerves of the lumbar and sacral plexus. If my memory serves me correctly, the adrenals were involved in the growth; certainly the kidneys were.

[1] London Lancet, August 7, 1880, *et seq.*

[2] Berlin. klin. Wochenschrift, 1883, p. 21.

REPORT OF A CASE OF FRACTURE OF THE BODY OF THE SCAPULA THROUGH MUSCULAR ACTION.

By JOSEPH LEIDY, Jr., M.D.,
RESIDENT SURGEON, PENNSYLVANIA HOSPITAL.

[Read January 14, 1891.]

An interesting case of fracture of the body of the scapula through muscular action was admitted to the receiving ward of the Pennsylvania Hospital with the following history.

C. F., aged thirty-three years, fell from the deck of a coasting vessel to the bottom of the hold, a distance of some twenty-five feet; in his descent he grasped a rope hanging near by with sufficient strength to steady himself; he immediately experienced a sharp, stinging pain in the shoulder which compelled him to relinquish his grasp, when he fell to the bottom striking upon his buttocks. On admission to the hospital he complained simply of pain in his thighs and desired to return to his home. While examining his back I happened to press over the right scapula, which caused him to flinch; making a more thorough examination of this region by grasping the spine of the scapula above and the inferior angle below, inserting my fingers well underneath and gently moving the bone in opposite directions, distinct crepitus was felt and heard by those near his bed; there was no evidence of contusion, and he assures me he did not strike his shoulder at any time during his fall; this part of the body could be manipulated and caused but little pain. There was no swelling and but slight deformity.

The treatment consisted in placing his arm to the side, holding it in position by adhesive plaster, a compress placed over the body of the scapula and a firm roller applied; the forearm was placed obliquely across the chest, and the roller of Desault applied over the whole.

Bony union had taken place at the expiration of two weeks sufficiently firm to allow the dressing to be removed permanently two weeks later. He has had some loss of power, but now, two months from the time of the injury, has perfect use of his arm and suffers no inconvenience.

Fractures of the scapula are placed among the rare accidents in surgery. Of over 4600 fractures treated in the Pennsylvania Hos-

pital from May 1, 1884, to December 1, 1890, but 17 were fractures of the scapula, or less than 0.37 per cent. Of these 17 the records show but 2 to have been fractures through the body below the spine, less than 0.05 per cent.; both were due to *direct* violence.

After a careful review of the literature bearing upon fractures of this bone, I have been able to find but *three* recorded cases of fracture of the scapula through *muscular* action in adults, one other in the case of a child, as follows:

1. Callaway[1] is quoted as reporting a case observed by Dr. Heylen: a man forty-nine years of age hung to a cart and was drawn along some one hundred yards; the diagnosis was clear.

2. Morris[2] reports the case of an engineer who fell forward against a lever and felt something snap; upon examination, a fracture through the spine was diagnosed.

3. Dobson[3] reports the case of a young artilleryman who in attempting to move a heavy iron target felt a snap in his shoulder, which upon examination proved to be a fracture through the body of the bone; crepitus was detected by the stethoscope in this case.

4. Gurlt[4] quotes from Michon a case in which a child getting up off the ground fractured the scapula through muscular action.

The case under observation is one of extreme variety; indeed, it deserves to be placed among the unique fractures caused by muscular violence.

[1] Packard-Ashhurst: Encyclopædia, vol. iv.
[2] Ashhurst: Encyclopædia, vol. iv.
[3] Dobson, G. E.: Lancet, London, Nov. 27, 1886.
[4] Keating: Encyclopædia, vol. iii.

APPENDICITIS.

By T. V. CRANDALL, M.D.

[Read February 25, 1891.]

The operation for appendicitis is one of the new revelations of abdominal surgery. It has been recently demonstrated to the profession, against the most persistent opposition, that laparotomy embraces large opportunities for saving life; and this is one of them.

The successes of those whom we know, Drs. Morton, Price, Keen, Penrose, Baldy, and others in abdominal surgery in this city, should convince many who still experience a holy horror at the mere suggestion of opening the abdomen, and openly cultivate a prejudice among the laity against surgical interference. Hence, the more discussion by the operators of to-day the better for the community.

Last year Dr. Morton reported seven cases to the College of Physicians with an able paper on the subject. Dr. Price is continuously operating and reporting cases, with others.

In my own experience I find cases of appendicitis that were at all severe, and pronounced recovered by blistering, rest, and alteratives, are having recurring attacks, each threatening life in proportion to skilful or unskilful treatment. They are living like a man over a magazine. They may go off at any time. It is in the intervening fairly comfortable time that operation on a sure diagnosis is most favorable. Still, when life is threatened, the gentlemen I have mentioned do not wait for fever to subside, but operate. If pus exists the symptoms are relieved at once by evacuation. If caused by a foreign body or intussusception, you have the diagnosis and cure at the end of the educated finger. Three cases are sufficient to illustrate my points.

Mrs. S., married, aged twenty-eight years, was taken ill on the 14th of last May with severe abdominal pain and vomiting. She had taken castor oil, Seidlitz powders, citrate magnesia, injections, etc. I saw her on the morning of the 15th. Temperature 105°. She had a large hard, tender tumor in

the right ilium; vomiting was persistent. I gave her one-tenth grain doses of calomel every two hours. Poulticed the abdomen, flushed the colon every three or four hours with two quarts of warm water through a fountain syringe. I continued this treatment through the day with counter-irritation over the epigastrium to allay vomiting. On the 17th there was profuse cold sweating and symptoms of depression. On making a section I found the appendix, ileum, cæcum, and ascending colon held in a mass of fresh adhesions, and the vermicular movement obstructed. The ileum and cæcum were distended with impacted feces, which I moved into the colon. After washing the peritoneum I closed, and gave more Seidlitz powders.

There resulted such an outpouring of strawberry-seeds, feces, castor oil, and "mixed physic," that the air of the neighborhood was changed. She made a rapid recovery without further event.

About the first of November I saw a case of recurring appendicitis brought to me from the South. Her first attack antedated this one two years; in the interval she had had four attacks, each one worse.

During the attacks the temperature would go to 103° and 105°; marked distention and tympany over the ileo-cæcal region, nausea, and obstinate constipation. I directed poulticing, rest, warm-water flushings of the colon, and these symptoms subsided, but there remained a large mass unyielding and tender. Amenorrhœa (suppressio mensium) for five months.

I recommended operation, but the prejudice was so strong I used a month's treatment by galvanism and massage, mixed doses of bichloride of mercury and iodide of potassium. I then asked Dr. J. Price to see her with me, and he recommended an operation. Dr. Morton subsequently gave a similar opinion. She is twenty-four years of age, well-nourished, well-proportioned.

I made a section on the 11th of December, and found a chronic abscess in the appendix, which was enlarged, at the base three-quarters of an inch in diameter, retracted, with strong adhesions of cæcum to anterior abdominal wall and general tying-up of the ileum, ascending colon, and right ovary. I broke up the adhesions, brought bowel out through the wound, amputated the appendix, and stitched serous coating of bowel over the stump. The ovary, which was somewhat enlarged, was loosened from its attachments, the peritoneum washed, and the wound closed.

I have to note an uninterrupted recovery without any bad symptom, menstruation restored, digestion perfect, and as the patient is a highly educated, refined lady, a valuable life is thus saved.

Contrast this with a case I saw in November of last year, where all symptoms were typical of appendicitis: consultation refused, fearing that my suggestion of operation would be concurred in, and death resulted from peritonitis following perforation of the appendix. The man was fifty-eight years of age, at the head of a family, possessing a sound physique. Post-mortem refused.

EXPERIMENTAL STUDIES IN INTESTINAL SURGERY.

By WILLIAM E. ASHTON, M.D.,

AND

J. M. BALDY, M.D.,

OF PHILADELPHIA.

[Read February 25, 1891.]

Our object in presenting this paper on intestinal surgery is to give a description of the methods and technique of the work we have done on the lower animals, so that surgeons who are unacquainted with this most important branch of surgery, and who desire to fit themselves to meet successfully the indications which arise from intestinal injuries or disease in man, may have a guide by which they can operate. We also desire to give to the profession such practical points on the surgery of the intestines as will not only increase success in operative work, but which will, at the same time, greatly increase the rapidity of manipulation. Abdominal surgery stands alone in that success is absolutely dependent upon familiarity of detail and rapidity of work. If no shock from a prolonged operation has been sustained, the patient's chances are increased a hundredfold. Given, for example, a case of intestinal obstruction, resulting in gangrene and stercoraceous vomiting, with the patient bordering on collapse, can any surgeon hope to save his patient if he takes from one to two hours in making an artificial anus, or in doing a lateral anastomosis with or without resection?

We pass at once to a description of the technique and instruments used in intestinal surgery.

Instruments.—A skilful abdominal surgeon is always known by the simplicity of his outfit and the small number of instruments that he requires. With the following armamentarium we are able to perform all the various operations on the hollow viscera: four pairs of hæmostatic forceps, a knife, a pair of scissors, needles, silk, silkworm-gut and catgut sutures, rubber ligatures and rings, and a few

sponges and towels. A special pair of forceps for invagination will be found useful, but in most of our operations we used for this purpose hæmostatic forceps.

The knife, scissors, and hæmostatic forceps should be those used in general surgical operations. The invagination forceps should have long slender blades, at least an inch and a half in length. If the blades of this instrument be too short it is difficult to make the invagination.

NEEDLES.—For the abdominal walls the long, straight spear-pointed needles are the best. The needles used on the intestines should be long, straight, and thin; they should have as large an eye as the shaft will permit, without the needle being wider at the eye than in the shaft. Darning-needles ("sharps, No. 6") fulfil these indications better than any others we have used.

SUTURES AND LIGATURES.—For the abdominal walls we prefer silkworm-gut. In the end-to-end invagination and in the implantation of the ileum into the colon it is necessary to make use of catgut, which should be heavy enough not to break readily. For all other purposes we found pure Chinese twisted silk, No. 1, the best. This material is strong enough to stand the traction necessary in tying, it is large enough not to be lost sight of during the operation, it is sufficiently rough not to slip through the fingers while being used (as pure silk will do), and it is readily threaded into the No. 6 darning-needle. For the ligation of bleeding vessels we use the same silk.

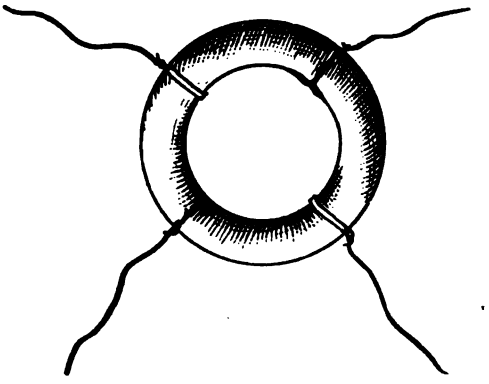
RUBBER LIGATURES.—It is necessary to prevent fæcal matter from invading the seat of operation during the manipulation. For this purpose many contrivances have been suggested and found useful. Nothing, however, is better than small rubber drainage-tubing, eight or ten inches in length. Ordinarily, two such ligatures are sufficient, but in an implantation of the ileum into the colon, for instance, it becomes necessary to make use of four.

RINGS.—Most experimenters have been dissatisfied with the materials used for approximation rings, and have made an effort to improve upon them. We also have fallen victim to this desire, and have been using a ring which we believe has some distinct advantages. The material used is solid rubber cord, $\frac{1}{8}$ of an inch thick, and from $2\frac{1}{2}$ to 3 inches in length, according to the size of the animal to be operated on. For the human gut, which is larger than that of an ordinary dog, it is better to use a cord $\frac{3}{16}$ of an inch thick, and $3\frac{1}{2}$ inches in

length, or even longer, if necessary. It is advisable to have rings of several sizes on hand during an operation.

In making these rings the cord is cut into either two or four segments, which are united, in the form of a circle, with catgut. The approximation ligatures, four in number, and made of Chinese silk-twist, No. 1, are tied to the catgut holding the different segments together. If the rings be made of two segments, as we usually make them, a strand of catgut is tied around the cord on either side, midway between where the sections are joined together. The approximation ligatures are fastened to them in the usual manner. (Fig. 1.)

FIG. 1.



Approximation ring ready for use.

These ligatures are threaded in the needles already described, and the ring is then ready for use. We claim for this ring many good points. It has a large opening, and the approximation surface is small and does not take up so much valuable room as many others do, at the same time the resulting approximation is sufficiently broad and firm. Again, these rings are solid, thus holding the parts immovable and also keeping the communication between the intestines wide open. The firmness of these rings also makes them much easier to manipulate. Further, they are easily and quickly made at a trifling cost. The catgut holding the segments of the ring together is generally found to be in good condition as late as the fifth or sixth day. We have never known it to become absorbed early enough to interfere with the success of the operation. These rings would be perfection were they only absorbable.

With the exception of Brokaw's hollow rubber rings, other rings

have too broad an approximation surface. In other words, they take up too much room in the gut and give too small an opening. This is so with Senn's bone-plates, Penrose's rubber discs, Abbe's catgut rings (which, in addition, are not always absorbed, as proven by Van Lennep and Shimwell), Davis's catgut mats, and Robinson's raw-hide plates. Excepting Senn's plates they all are too pliable, or, at least, become so soon after being placed in position. Again, with the exception of the Penrose discs, they are too difficult to make and are expensive, and for some it is impossible to obtain the material. The ligatures in Senn's plates are so complicated as to make them dangerous. The Brokaw rings more nearly approach the advantages of our own.

For end-to-end invagination, or for implantation of the ileum into the colon, an entirely different kind of ring is required. This ring must be small enough to be introduced into the gut, and as thin as is consistent with the necessary firmness. The surface must be comparatively broad. The best material for this purpose is the larger-sized rubber bands found in the shops, which are used for holding together bundles of paper. The bands should be fully half an inch broad and about one-sixteenth of an inch thick. They can be cut into strips of the required length, according to the calibre of the gut. The ring is then made by stitching the ends together with three catgut sutures. It is well, after the ring is finished, to turn it inside-out, so that the suture-knots shall be on the inside.

The main object in the after-treatment is to keep the patient as quiet as possible and to avoid unnecessary disturbance, either with food or drugs.

In describing the operations on the hollow viscera, we will go into the details of only lateral approximation of the ileum, with or without resection, and of end-to-end invagination and implantation of the ileum into the colon, as all other procedures are based upon these and are simply variations. For instance, the approximations of the duodenum and stomach are performed by almost exactly the same method as an approximation of two loops of ileum. A short incision (two or three inches) is made through the abdominal wall. The parts to be operated upon are brought up through the incision, and invariably so nearly fill the opening that it is unnecessary to take any other precautions to protect the peritoneal cavity from dirt; consequently, irrigation and drainage are unnecessary. During the operation the parts are frequently deluged with large quantities of warm water.

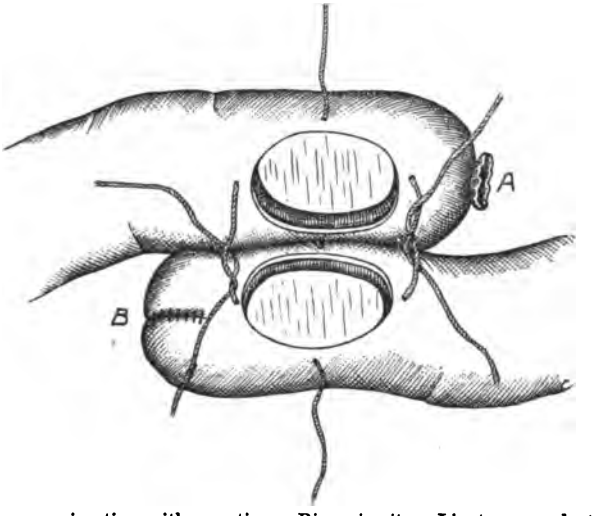
SIMPLE LATERAL APPROXIMATION.—A loop of the small intestine is grasped with the fingers and brought through the opening. The gut is quickly stripped between the fingers until about eight or ten inches are free from feces. A rubber ligature is then placed at each end of the cleared space and lightly tied with a single knot. Of course, these ligatures must perforate the mesentery. This is accomplished by grasping one end of the ligature by a pair of hæmostatic forceps; carefully avoiding bloodvessels, it is then passed through the mesentery, close to the gut. The incision is now made on the free surface of the gut, directly opposite its mesenteric attachment, and the ring introduced. The opening is made as large as the ring will permit; it may, however, be enlarged after the sutures are introduced. As soon as the ring is in position the ligatures are passed through all the coats of the gut from within outward, the needles removed, and the ends allowed to hang loose until the other ring is in place. The end of the gut near the second rubber ligature is now treated in the same manner, and the second ring introduced. The corresponding ends of the opposite ligatures are taken up and tied together, thus completing the operation. To further strengthen the approximation, a supplementary suture should in all cases be placed entirely around it, on the serous surfaces. We prefer a continuous silk suture for this purpose, as it gives a better and safer apposition, but it should include only the serous coat of the intestine. After this step is completed, the rubber ligatures are removed and the field of operation is thoroughly cleansed with warm water; the intestines are then carefully replaced in the abdomen and the abdominal wound closed. Silk sutures are used throughout this operation.

LATERAL APPROXIMATION WITH RESECTION.—In this operation the same steps are taken as in the preceding, with some additions. A larger section of gut is emptied of feces, and, after the rubber ligatures are adjusted, as much of the intestine is resected as is desired. Care is taken to leave sufficient gut (three or four inches) beyond each rubber ligature, in order to leave room to invaginate the ends and introduce the rings. When the mesentery is reached in making the resection, the mesenteric vessels should be grasped on each side by a pair of hæmostatic forceps. The incision through the mesentery is carried on each side along the line of the mesenteric vessels to a single point at the base of its attachment; it is here ligated and cut away, thus removing a wedge-shaped piece.

The next step is to invaginate the free ends of the intestine (Fig. 2). This is accomplished by first removing the hæmostatic forceps from

one end and then grasping the cut edge of the gut with the invagination-forceps, care being taken to include at least half an inch of the bowel; the free end is now pushed into the gut, carrying the mesentery

Fig. 2.



Lateral approximation with resection. Rings *in situ*. Ligatures ready to tie. *A*. Cut end ligated; *B*. Cut end invaginated.

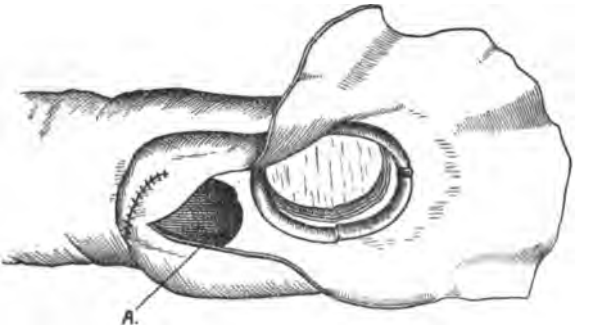
with it. A continuous suture is "whipped" over this inverted end, beginning at the mesenteric attachment and including this point; the forceps are then withdrawn. When the invagination is completed, the bleeding from the mesenteric artery ceases. The second free end is treated in the same manner. From this stage the operation resolves itself into a simple lateral approximation, and is performed in exactly the same manner. Silk sutures are used throughout this operation.

End-to-end Invagination.—The first step in this operation is to make a resection. This is performed precisely as previously described. A rubber ring, of the proper size, is then introduced into the proximal end of the gut. The proximal end is found by sprinkling a few grains of common salt on the loop of intestine and watching the peristaltic wave which is excited. With a continuous catgut suture the cut edge of the bowel is stitched to the lower edge of the rubber ring. This holds the ring in place and prevents the complication of the ring slipping out, or of the ends of the intestine curling.

A strong catgut suture with a needle at each end is now introduced. Each needle is carried in turn into the lumen of the gut until it

reaches the upper edge of the rubber ring; it is then made to perforate the rubber, passing directly through both it and the intestinal wall. By this manœuvre both ends of the suture are brought outside of the gut. The gut-wall and upper edge of the ring are thus caught

FIG. 3.

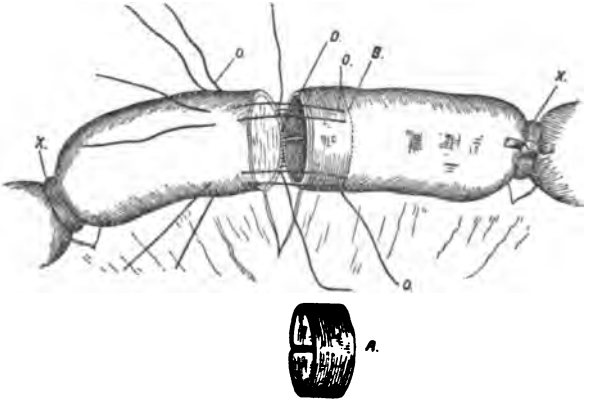


Approximation completed. Section of gut opened to show rings in place.
A. Invaginated end.

in the loop of the suture. One of the sutures is placed close to the mesenteric attachment of the gut, and the other two are placed at equal distances from it and from each other. The operator now takes up the two needles of the same ligature and introduces them into the distal end of the gut. The two ends of the suture should be placed side by side, and should run parallel with the long axis of the gut. They should perforate the tissues of the distal end half an inch above the cut edge, should pass through the peritoneal and muscular coats only, and should be brought out about one-fourth of an inch from their insertion. The other two double sutures are placed in a similar manner and the needles removed. That portion of the gut containing the ring is now invaginated into the distal end, the mesentery being carried with it. All the sutures are then pulled taut, but before tying them care must be taken to turn in, around the whole circumference of the intestine, the cut edge of the distal end. A supplementary suture should be placed around the whole circumference of the invagination. For this we prefer a continuous silk suture. We have found that the operation can be more quickly and easily performed, and that it is safer, if we rapidly stitch together the cut ends of the gut with a continuous suture passing completely through all the coats of the gut. This suture should be introduced just before the time of invaginating and tying the double sutures. No one has, as yet,

brought this fact forward, and we believe that it will lessen the mortality to a great extent. The invagination is absolutely perfect, and with the final supplementary suture there is a minimum danger of leaking.

Fig. 4.

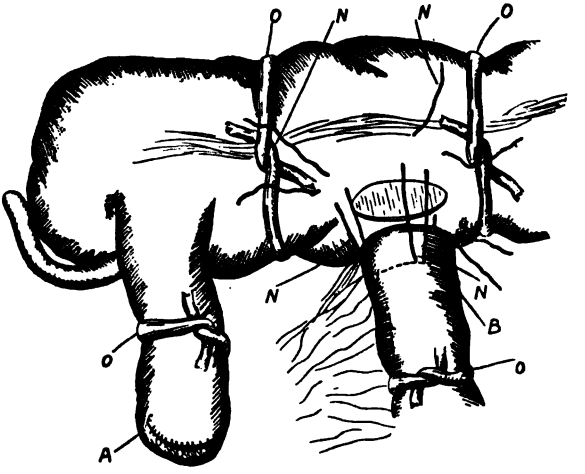


End-to-end invagination. *A.* Invagination-ring; *B.* Upper end of ring when in place; *D.* Ends partly stitched; *O O O.* Ligatures in place; *X X.* Rubber bands in place.

Implantation of the Ileum into the Colon.—This procedure consists essentially of two operations, namely, a resection and an invagination. First, the ileum is resected in the usual manner, care being taken to invaginate only the proximal end of the severed gut. The resection should be made as close to the colon as possible, so as to leave only a shallow blind pouch. The colon is then brought into the incision, and a portion (four or five inches long) immediately above the ileo-cæcal valve stripped free from fecal matter; the feces are held back by an extra pair of rubber ligatures, introduced and tied in exactly the same manner as described in the approximation and resection operations. A ring (similar to the one used in the end-to-end invagination) is placed in the free (distal) end of the ileum and is fastened there in the same manner as is the ring in end-to-end invagination; three sutures are also introduced, as in that operation. An opening, large enough to admit the end of the ileum containing the ring, is made in the colon at a point directly opposite the attachment of the meso-colon. The sutures from the ileum are then introduced into the colon in the same manner as they are in the distal end of the ileum in the end-to-end invagination, only instead of being passed in the long axis of the gut they are here passed so that they

radiate in different directions in the transverse axis. The necessity of this arrangement of the sutures will be at once apparent when the parts are in place. The sutures being properly introduced, the ileum, carrying with it the mesentery, is invaginated into the opening in the colon. The sutures are then drawn taut and securely tied, care being taken that the cut edges of the colon are inverted around the circumference of the opening. A supplementary continuous suture of silk should be introduced as in the other operations.

FIG. 5.



Resection of ileum, with invagination of ileum into colon. *A*. Resected and invaginated end of ileum; *B*. Upper end of invagination-ring; *N N N N*. Ligatures in place; *O O O O*. Rubber bands.

We have conducted a large number of experiments on dogs during a period of some months, in order to familiarize ourselves with the technique of the operations, and to determine the safety of the several proposed operative procedures. The outcome of this experience has convinced us firmly that no one can do justice to his patients, should he be called upon to perform such operations, without having previously done some experimental work, either on living animals or on the cadaver. The advantages of the living animal over the cadaver for such purposes are so obvious as to need no discussion.

In a large majority of the experiments we found that the omentum became adherent to the incision. This same condition is often found by those of us who are called upon to perform secondary operations upon the human subject. In post-mortem examinations we frequently

noted that in cases in which, during the operation, no care had been taken to bring the omentum down, there were no omental adhesions. This was not only true as regards the incision, but also the seat of the anastomosis. The question, therefore, naturally arises whether it would not be well in all cases of abdominal section to push the omentum up out of the way before closing the wound. It may be argued that if the omentum is not brought down and interposed between the incision and the intestines, the latter will become adherent instead of the omentum. This, however, has not been our experience with either the lower animals or human subjects. The peristaltic action of the gut is sufficient to explain this difference.

As to the value of omental grafts, we have our doubts. It is true, as Senn and others have claimed, that in some cases in which there is danger of leakage and consequent infection, an abscess may form, and the general peritoneal cavity be protected for a time by the graft. Such has also been our experience. But at the same time it is true that, in cases in which no omental graft was used we had an occasional abscess, which was just as surely shut off from the peritoneal cavity by the contiguous folds of intestine becoming adherent about the seat of infection. In either case the abscess would probably eventually prove fatal, if not relieved by operation. The disadvantages of the graft are so plain that we would not attempt to use it in the human subject, except under peculiar circumstances. The fewer cut surfaces left in the abdominal cavity the better, as each one is a point to which some near knuckle of intestine may attach itself. This is, to our minds, one of the greatest disadvantages of abdominal surgery, and it has been most forcibly brought to our attention in this experimental work on the intestines. We have had numerous opportunities to examine the condition of the parts at varying periods of time after operation. In almost every dog which died, or which was killed, we found the seat of the operation bound up in a mass of adherent omentum and intestines. Sometimes, so great were these adhesions that it required very careful search to discover just which knuckles of gut contained the approximation; and a number of times, in spite of the greatest care, we separated the approximated surfaces in our efforts to discover the seat of operation. Every unnecessary raw surface tends to complicate this condition, and for this reason alone we believe omental grafts should be abandoned. Our own operations were successful without them. If the omentum is brought down and attached about the seat of operation without cutting the graft free, it makes the mass only the more complicated. Robinson and others

have reported cases in which a knuckle of intestine slipped under this kind of graft and became strangulated. In these adhesions there may be a great future danger to the patient. It occurred to us that perhaps some material might be found that could be smeared about the seat of the operation and protect the parts from adhesions until the inflammatory condition abated sufficiently to make it safe from adhesions. We were not successful, however, in finding anything. Van Lennep tells us that iodoform collodion, as recommended by Stern, will prevent the adhesions; but it also prevents the union of the approximated surfaces. It is to be hoped that in the near future some reliable substitute may be found. Very frequently, abdomens are opened to break up adhesions and relieve pain or obstruction caused by these adhesions. Why should not some of these patients on whom we do approximation operations succumb to this condition? That such will be the outcome in a certain proportion of cases we have no doubt.

Another factor, which adds to the danger of future obstruction, is the small size of the communication between the intestines. This opening is, of necessity, smaller than the calibre of the gut, and for this reason alone there is danger of future trouble. As a matter of fact, the openings, as usually made, are smaller than necessary. This is the greatest fault with the Senn plate. Brokaw's and our own rings give the best chance for a free communication; there is a larger hole in the ring, and the narrow approximation surface takes up less of the much-needed room in the gut. Even with these rings we have found the resulting communications in the intestines too small. The openings have a tendency to become even smaller as healing and contraction go on. We have found in a certain number of cases large masses of feces forming an obstruction immediately above the communication—one or two dogs dying from this cause. How, with these small openings and the masses of adherent intestines, all patients can escape future trouble from the operation itself we cannot see. Of course, we do not mean to decry the advisability of these operations. Every surgeon should be prepared and able to do them. In cases in which they are advisable it is, as a rule, a matter of life and death to the patient. If we saved a life for only a few weeks or months, the operation would be well worth the doing. We desire to call attention to possibly future dangers, with a view to discerning some way of preventing them.

There has been some discussion amongst operators as to the best method of bringing the two loops of gut together after resection. We have found it immaterial whether the ends of the gut be brought

together side by side in the direct line of its long axis, or whether the two ends be folded on themselves. In either case the mesentery may be stitched together by a few extra sutures, if the operator prefers. It is probably safer to insert these extra sutures, and thus avoid all danger of a knuckle of intestine slipping between two folds of mesentery. In case this accident should happen, there would be danger of subsequent obstruction. However, unless the hernia occurred within the first few hours after operation, adhesion would have taken place between the two mesenteric folds, and thus have obviated the danger.

When a resection and a lateral anastomosis have been made, there may be several causes of trouble in the subsequent progress of the case, referable to the blind pouches left by the invagination of the free ends. In one of our cases the invaginated end was so long as to hang down over the communication between the intestines, and thus acting as a ball-valve, caused death by obstruction. In other cases the *cul-de-sac* formed by the invagination was found filled with hardened feces. Both these difficulties may be avoided by invaginating only a small portion of the gut, and thus making the anastomosis-opening close to the end.

Together with all other operators, we have found that there is little danger of feces accumulating in the portion of intestinal canal excluded by these operations. In all cases this portion of the gut has contracted, and has subsequently been found to be free from fecal contents.

One of the most important lessons that our experimental work has taught us is, that the principle of *lateral approximation* should be used in every instance in which it can be applied. In itself it is a very simple and easy operation, and can generally be completed in from ten to fifteen minutes. In not a single case did we lose a dog on which we had performed a lateral approximation of two loops of the small intestine, with or without resection, except when we experimented with the cut ends after resection. Such has been, to a great extent, the experience of all operators. The principle of lateral approximation may be carried out almost *ad infinitum*. If two sections of the small intestine are to be joined, a lateral approximation should be made; if the small intestine and the stomach are to be brought together, the union should be by lateral approximation; if the small and large intestines are the parts to be dealt with, still a lateral approximation is the operation of choice; indeed, this method should be practised if any of the other hollow viscera are to be united.

So thoroughly are we convinced of the greater safety of this operation over any of the other methods, that with our present experience we would not dare to attempt an end-to-end approximation or an invagination on the human subject in cases in which we had the choice. Our mortality from the end-to-end approximation after resection amounted to more than 30 per cent. Brokaw, in his experiments, had a mortality of 50 per cent., and other experimenters have shown no better results, whatever method was employed. The mortality of the implantation of the ileum into the colon after resection of the ileum just above the ileo-cæcal valve was better. Our first two or three operations of this kind ended fatally, because we used a faulty method, and there was leakage. After we had learned how to do the operation properly, our mortality did not rise much above 10 per cent. Other surgeons have done better than this. Shimwell claims that all his operations of this kind terminated favorably. He is the only one, however, who has been so successful. The operation involves much greater handling of the parts, and it takes about twice as long a time to complete. In addition to this, it is a comparatively difficult operation to perform, and we have found it an unsafe one, even after long experience and with the greatest care. On the other hand, where we resected the ileum at the ileo-cæcal valve, and then made a lateral approximation to the colon higher up, we had uniform success, excepting in one or two instances, in which death was due to other influences. Shimwell found ileo-colotomy a very fatal operation, and believed it to be due to the tenesmic action of the colon. His ligatures broke in seven of these cases, all of which died. It is much more probable that he did not properly repair the damage done by the break (of this accident we will have more to say later) than that the operation was at fault. The mesocolon is long enough to permit sufficient peristaltic action without putting any strain on the approximated surfaces; at any rate, not more than occurs in the case of the approximation of the small intestine. In every case the colon must be brought out of the incision to make the approximation. If, therefore, it has sufficient freedom for this, it is free enough not to be subsequently injured by a little peristaltic action. When the colon can be easily brought into the wound (and if it cannot, the operation is practically impossible), the lateral approximation can be made as safely between colon and ileum, as between two loops of the ileum itself. Senn reported to the American Surgical Society at Washington two cases of lateral approximation of the colon and ileum done on the human subject, one of the cases making a good recovery.

In cases of lateral approximation with resection, it is necessary before approximating the two loops of gut, to deal with the open ends. The method adopted by all surgeons heretofore has been to invaginate the free ends and close them with a continuous suture. This detail occupies some time and the operation can be materially shortened if a more expeditious way were found of dealing with them. It occurred to us that a simple ligation of the end of the gut might answer the purpose, and this was tried in a number of cases. (See Fig. 2, *A*) After a ligature was thrown around the intestine as near the cut edge as possible, the exposed mucous membrane was quickly scraped away with the handle of the scalpel, and the ends were freely washed with water, and dropped. This proved successful in a large proportion of cases—about 60 per cent. In the dogs which died, it was found that either quite a large end had been left, or the mucous membrane had not been scraped away with sufficient care. In all these cases there was a localized abscess about the stump, and in several a general peritonitis. As the matter now stands, it would be an extremely unsafe procedure on the human subject. However, something may come of it in the future, and it is well worth the attention of experimenters. The stump is tied and dropped in this manner in cases of pyosalpinx and of diseased appendix vermiformis: why not in the intestine itself? We would suggest that the ligature be applied, the stump carefully scraped free of mucous membrane (which can be readily done), the ends of the stump trimmed close to the ligature and a sponge saturated in an antiseptic solution held over it for a moment. It seems to us from our results that the method promises safety. Wherever there is sufficient material to invaginate, we would not think of attempting the ligation method; but cases may arise in which there is no tissue to lose, and in such, if the latter can be done safely, it may prove invaluable. The point is well worth considering, and we hope to report further upon it.

The danger of breaking one of the approximation ligatures, or of having it loosen during the manipulation, has been dwelt upon by several writers. Shimwell broke a ligature in eight different operations, and lost seven of the animals. He asks, "What is the remedy?" and answers, "The only thing that can be done is to remove the portion of the ileum operated upon and to insert a new ring into the colon, being careful to pass the sutures well beyond the former sites." In our own work we broke a ligature three times, and in one case two of the four ligatures broke on account of a badly-prepared ring, and yet all the dogs made good recoveries. Lembert sutures were substi-

tuted at the points of break, care being taken to introduce them beyond the puncture of the broken ligature. We are at a loss to account for the bad results in Shimwell's operations, unless they were due to the rings. He used the Brokaw or rubber-tube ring, while we used our own solid rubber-cord ring. Our rings are so firm and do their work so well, that after they are in place and two or three ligatures tied, the approximation is almost completed, and needs but little additional support. As we have proven in our work, it matters not if one of the ligatures breaks; the accident can be easily and quickly repaired by the insertion of a Lembert suture.

As to the necessity or even advisability of scarification, we decidedly take exception to the views advanced by other operators. The disadvantages and dangers of this detail in technique are, it seems to us, serious, and its advantages *nil*. An uninjured peritoneal surface will successfully resist infection, while one in which the solution of continuity has been broken will succumb. Consequently, if we scarify the peritoneal investment of the gut immediately around the openings, there is greater danger of infection, especially as that portion of this surface not directly pressed by the rings is practically free in the intestinal canal. This free scarified portion will, of necessity, become infected, in case the approximation is weak at any point; even though it be not weak enough to allow of actual leakage into the peritoneal cavity, yet the adjacent scarified and approximated surfaces will be infected. In consequence of this, suppuration occurs between the approximated surfaces, and even on the sides of the approximation in the peritoneal cavity. Or, if the whole surface be infected, when the rings fall away it will be found that union is weak, or has not occurred. We have found these conditions in several cases in which scarification was used, but never when the approximation was made without it. Again, the bleeding almost always incident to the scarification considerably embarrasses the subsequent handling of the sutures and the completion of the final steps of the operation. If there were any advantages in the scarification these risks would be justified; but there are none. In no instance did an approximation fail where we did not scarify. The rings always remain in place for from four days to a week, and by that time the union of the unscarified peritoneal surfaces is sufficiently firm to resist any pressure likely to be brought to bear on them from within.

DISCUSSION.

DR. W. KEEN: I should like to take exception to the term typhlitis. I think that it is unfortunate to revive these old names of typhlitis and perityphlitis since it has been proven that the appendix is the part involved primarily in ninety-nine out of one hundred cases. We should adhere to the term appendicitis rather than to typhlitis or perityphlitis.

I think that the most instructive papers on this subject are those of Dr. Fitz. His first paper was read four years ago, and published in the first volume of the *Transactions* of the Association of American Physicians. I would also call attention to his remarks following the paper of Dr. Norman Bridge, of Chicago, at the last meeting of the Association of American Physicians in Volume V. of their *Transactions*.

One point that struck me in Dr. Crandall's paper was that in one case when he desired to operate, he was foiled by the opposition of the family physician. This is significant as showing that many physicians are not yet educated up to the point of recognizing the necessity for operation in these cases. The old date of eight or twelve days, as laid down by Willard Parker in 1867, is obsolete. I think that, now, well-informed surgeons are in favor of operating on the fifth, fourth, third, or even on the second day. There are exceptional cases in which the operation may be delayed, but, as a rule, the earlier the operation after forty-eight hours of inefficient medication, the better for the patient.

I am glad to see that Drs. Baldy and Ashton have taken the ground in favor of lateral anastomosis. The arguments of speed, safety, and the thorough attainment of the end in view, are sufficient to make this the proper and common method rather than end-to-end approximation.

The needles shown are excellent. Dr. Halsted has used milliners' needles, which are equally useful. Almost any form of small round needle, with a fairly large eye, will do.

I had intended to bring with me a little clamp for constriction of the bowel, which I purchased in Berlin last summer, but the name of the inventor was unknown to the instrument-maker. The instrument is a little steel bar, with a slit in each end. This is passed through the mesentery and a piece of rubber tubing is caught in one end, then drawn across the bowel and caught in the other end. Rubber tubing or a rope of sterilized gauze will do very well, but this seems to me less likely to injure the bowel.

In regard to the sutures, the common statement is that the sutures include only the serous coat of the bowel. The object is, I suppose, to indicate that the sutures do not penetrate all the coats. Halsted has recently called attention to the fact that the peritoneum can be represented in a drawing as only an extremely thin line. A suture in it or in the muscular coat will not hold. The essential coat is the submucous coat. This is dense, firm, and strong, and if only two or three shreds are caught with the needle, they will hold with the tenacity of the thread itself. It is easy to recognize this coat by the resistance it offers to the passage of the needle, especially if the needle be forced along by the pulp of the finger.

Next, as to the size of the openings in the bowel. Some time ago I saw Dr. Abbe, of New York, operate on a case of fecal fistula, in which he made a lateral anastomosis. The opening was large, and seemed ample. The patient died some months later, and it was found that the opening had narrowed and contracted so that ultimately there would have been complete obstruction. This contraction would not be so apt to take place if, instead of making a simple slit, the bowel were pinched up and an oval piece removed.

While Dr. Baldy was describing the disposition of the cut ends of the bowel, the thought occurred to me that these might be dealt with in another manner besides the two methods which he mentions. Ordinarily the ends are invaginated and sutured first, and then the approximation openings are made. I would propose to make the lateral opening for the lateral approximation first, then pass a pair of forceps through this opening, seize the open end, draw it through the lateral opening and throw a ligature around it, thus bringing the two serous surfaces together. If desired, a continuous suture might then be applied to the cut edge for further safety. If experiment prove that the ligature alone is sufficient it would abridge the time for the operation to a considerable extent.

The sutures which have been usually adopted have been the Lembert and the ordinary continuous suture. I do not think that the profession has appreciated the value of another form of suture, which was introduced by Dr. Cushing, of Boston (*Boston City Hospital Report* for 1889), and termed by him the "right-angle continuous suture." This is a modification of Halsted's quilted suture. Dr. Cushing has a complicated beginning and ending, but I have begun with a simple knot. The suture then crosses the opening and then enters the coats of the bowel, and passing a short distance parallel with the axis of the bowel it is brought out, carried to the opposite side and again introduced into the bowel, carried a short distance along the axis of the bowel and then across, and so on to the end. The free end is then passed two or three times through its own loop and cut off. This invaginates the coats of the bowel completely, and the suture is at the same time buried. It is a rapid suture, requiring less time than the Lembert or Halsted's quilted suture, especially on account of their many knots, which require so much time. I used it recently in a case with great speed and an entirely satisfactory result.

DR. B. T. SHIMWELL: I think that the instruments mentioned by Dr. Baldy are all that are required, but if the hæmostatic forceps are to be used to invaginate the end of the bowel, the blades must be long and narrow, otherwise you are apt to bring out the invaginated bowel when you remove the forceps. It is necessary that the sutures at the mesentery be first introduced, for it is the retraction of the mesentery that gives trouble.

I saw one case in which the bowel was tied in the manner described by Dr. Baldy. There was no saving of time gained, for the end of the bowel can be whipped in in two minutes. The whole time for an approximation is ten minutes. The amount of tissue left to allow for contraction must be determined by experience. Retraction takes place to a considerable extent.

The ring shown to-night is the best ring I have seen. As it has less catgut, it is more apt to pass readily. The other forms of ring I have seen retained.

I have had pretty fair results with the end-to-end approximation. If you put in only the double sutures it is as rapid as lateral approximation; if you put in three or four it is not so rapid. Two will hold, but it is better to put in two extra sutures. When doing the end-to-end operation an assistant must hold the cut end while the ring is being whipped into the proximal end, otherwise there will be eversion of the mucous coat.

The application of salt is the only method that I know of for determining which way the bowel runs. Great care, however, must be taken that all the salt is removed. In the end-to-end implantation the first sutures must be placed at the mesenteric attachment. If this is not done the mesentery will draw out. I do not think that implantation takes more time than approximation. Every case that I have done, has done well. Some I put in with double sutures, but I whipped in extra interrupted sutures to make all secure.

I think that the small size of the openings is more the fault of the operator than that of the operation. I, however, do not see the necessity of cutting out a portion, for the tissue sloughs off to the point where the ligature passes through the coats of the bowel.

I think that there are advantages in bringing the sides of the intestine in apposition, by turning them over like the leaves of a book rather than in sliding one on the other. By the former method you save from four to six inches of bowel.

My results with approximation of the ileum and colon have not been good. Senn leaves that subject with few remarks, and advises that extra sutures be put in. In tying the ligatures in ileo-colotomy if one ligature breaks you cannot have close apposition. This will lead to the extravasation of fecal matter between the serous surfaces, and peritonitis. I do not think that scarification is necessary.

We find in surgical books the statement that in gastro-enterotomy, where the duodenum is hard to find, you should take a portion of bowel with sufficient mesentery to allow of the approximation. I did that on a dog; the dog recovered, but finally sickened and died, and I found that I had cut off the whole small intestine.

DR. A. J. DOWNES: In connection with Dr. Crandall's paper, I wish to briefly refer to a case of my own. October 14th I saw a woman, sixty-four years of age, suffering with intestinal pain and evidences of inflammation in the region of the cæcum. With Epsom salts and other remedies I succeeded in relieving her. November 10th there were symptoms of a second attack. In the previous attack operation was suggested. The pain and inflammation became so severe that she yielded to the advice, and I operated on the morning of November 13th, removing the appendix. She made a rapid recovery. I report the case simply on account of the fact that I operated as early as the sixtieth hour after the beginning of the attack.

DR. JOSEPH HOFFMAN: Dr. Fitz, in his first paper, in which he reported cases collected from various sources, made the average recurrence 11 per cent. In his own cases, reported in a later paper, he makes the average recurrence 44 per cent. According to Kraaft, the average is 22 per cent. It has been shown by Rokitansky that the caput coli has a great circle of revolution. It is evident that adhesions may occur, and that

many cases of appendicitis so called are not appendicitis at all. They are cases of peritoneal inflammation, which get well without treatment. If these cases are included under the head of appendicitis, it is clear that the average of recurrences will be diminished—in these cases, where there has been no recurrence, the probability is that the attack has not been appendicitis, but simple blocking up of the bowel or simple inflammatory peritonitis.

Another last year's paper, which is remarkable from the fact that, emanating from a surgeon, it is more conservative than the paper of Dr. Bridges, a physician, is that of Dr. Dennis, of New York. He argues in rather a strange fashion in regard to the treatment of appendicitis between recurring attacks. He argues that as only 11 per cent. recur, and that out of this number only a few become suppurative, and as peritonitis may get well without operation, of this latter class some do not die, therefore it is not necessary to operate between recurring attacks. He prefers operation early in the attack—as early as the second day. In these cases this operation gives almost perfect results. Dr. Dennis seems to lose sight of the fact that early operation obviates the necessity for later interference, and that it is better to resort to surgery between attacks than to wait for a final fatal explosion.

The argument for waiting for recurrent attacks is a vain one, even although recurrences may take place during a number of years and not kill; and it does not take cognizance of the fact that early operation for any abdominal trouble before complications exist is almost uniformly safe.

DR. ASHTON: I agree with those who have spoken that it is almost impossible in any given case of appendicitis to say exactly what the pathological condition is. In some cases there is pus, in others there is none, but it is often impossible to say whether pus is present or not. The appendix may be on the eve of rupture from ulceration, but there is no evidence of the condition. On looking over the report of twenty cases, some by Morton, some by Bernardy, Baldy, Penrose, Keen, a case by an Englishman, and one of my own, I find that in eight of these cases there were general adhesions, but no pus cavities. In one case the appendix contained pus. In three cases, it was enlarged and cheesy. In two the same condition existed with the addition of perforation. In the other two cases the organ was enlarged and ulcerated, but without perforation. If I were to have an attack of appendicitis myself, I should let the first attack pass by, but if there were a recurrence, I should have the abdomen opened whether there were evidences of pus or not.

In regard to the paper of Dr. Baldy and myself, I have but a few remarks to make. Dr. Keen's idea in regard to the treatment of the free end of the intestine is the best method yet suggested. The method of tying without invagination is, I think, unsafe.

The device mentioned by Dr. Keen for keeping back the feces is no better than the rubber ligature, and besides, it adds another instrument.

The contraction which takes place in the opening of the gut is due to cicatricial contraction, and not the result of muscular action. It makes no difference whether you simply make a slit or remove an oval-shaped piece, the contraction will still take place. The removal of a piece will, however, probably be of service.

DR. BALDY: A word in regard to recurring attacks of appendicitis. In an original attack of appendicitis, the symptoms not being too severe, I should hesitate before opening the abdomen. Statistics show that more than half of the cases do not have a recurrence, so that at least this proportion can be eliminated. I agree that it is difficult to say whether or not there is pus. If that point can be settled in the affirmative, the operation should be immediate. I should wait until I was fairly convinced that there was pus before I should operate in the first attack.

In regard to Dr. Keen's suggestion to tie the end of the bowel after invagination, I think that it is an admirable one. The openings in the specimens shown are not so large as they were originally, but in these cases it is not possible to use a ring beyond a certain size.

The objections to the repair of the damage done by a broken ligature may be good theoretically, but the fact remains that we did it.

LUMBAR *VERSUS* ILIAC COLOTOMY.

By JOHN B. DEAVER, M.D.,

PROFESSOR OF SURGERY IN THE PHILADELPHIA POLYCLINIC; DEMONSTRATOR OF ANATOMY AND LECTURER UPON SURGICAL ANATOMY IN THE UNIVERSITY OF PENNSYLVANIA; ATTENDING SURGEON TO THE PHILADELPHIA, GERMAN, ST. AGNES'S, AND ST. MARY'S HOSPITALS.

[Read February 25, 1891.]

THE subject which appeals to every surgeon whose lot it is to see many cases of carcinomatous disease of the rectum, is that of colotomy. My object in writing a paper on this topic is to record the result of my experience in the two operations—lumbar and iliac, not inguinal, as it is frequently called; to advocate the establishment of an artificial anus early in the disease, when it is not feasible to remove the involved portion of the bowel; to speak of the indications for the operation; and of operative procedures other than colotomy, for malignant disease of the large intestine elsewhere than in the rectum.

Having performed both lumbar and iliac colotomy, I am convinced that, in the majority of cases, the lumbar operation is preferable, as well as the most logical, for the following reasons:

1. Notwithstanding the opening of the peritoneal cavity is now a factor of comparatively little importance when deciding between what shall be an intra- or an extra-peritoneal operation, I believe that, when the same end can be accomplished without opening the peritoneum, the patient should be given the benefit of it. We must admit that an additional risk, be it ever so small, is coupled with an intra-peritoneal operation.

2. Regarding simplicity. The essential element of success in any operation is a correct knowledge of the surgical anatomy of the part. The lumbar operation is as simple as the iliac, especially when the intestines are greatly distended, as they are apt to be in the advanced stages of the disease, when symptoms of obstruction are pronounced and when acute obstruction supervenes upon chronic. In opening the peritoneal cavity where the abdomen is distended, the protrusion of

the small intestine through the wound complicates the operation. When the abdomen is distended, the lumbar operation is simplified by the bulging of the colon into the wound, thus making it more accessible. The advocates of the iliac operation claim that the additional advantages gained by opening the peritoneal cavity, providing the disease has not extended too far, are: to verify the diagnosis, to determine definitely the extent of the disease, to resect and reëstablish the continuity of the canal. I do not regard the diagnosis in carcinomatous disease of the rectum or the sigmoid flexure, assuming the form of a growth or a stricture, with symptoms both local and general, together with the history of the case and what can be learned by an examination of the abdomen and of the rectum (if need be, assisted by anæsthesia), at all difficult. Where the sigmoid alone is involved, the additional comfort gained by a resection would not warrant the patient assuming the risk consequent upon this operation, in comparison to that of establishing an artificial anus through the loin.

The advocates of the iliac operation, again, produce the following arguments in its favor, namely:

1. The impossibility of opening the small for the large intestine. In answer to this I can say, this mistake cannot occur in the lumbar operation unless the peritoneum is opened, which should not occur to a careful surgeon, non-interference with the peritoneal cavity being the important factor in the lumbar operation. Should the surgeon be unfortunate and open the peritoneal cavity in the lumbar operation, mistaking the small for the large intestine would be a gross anatomical error. The presence of one or more epiploic appendices tells positively that it is the large intestine, these never being present as constituents of the small intestine. Again, the arrangement of the longitudinal muscular fibres of the large intestine into three separate bands, and the sacculated condition of the large intestine where both are not obscured by distention of the gut, assist in deciding the question. The small intestine may be met with so distended as to equal or exceed in size that of the circumference of the large; under such circumstances, the question of difference would be still more difficult for the surgeon not familiar with the anatomical peculiarities of both. The percentage of cases in which the descending colon does not hold its normal position to the abdominal walls posteriorly is so very small as, in my mind, not to enter into the question of deciding between the two operations. In the large number of bodies I have seen dissected in the anatomical rooms of the University of Pennsylvania, I have yet

to meet with a single case of pronounced anomalous arrangement; yet, I would not be understood as disputing the fact. Mr. T. Bryant, having operated in 170 cases, in but one of which he found it necessary to prolong his incision forward to find the colon at the brim of the pelvis, is the best argument to offset that set forth by the supporters of the iliac procedure.

2. The position of the anus in the iliac operation is claimed to be a more convenient one for the patient to keep clean, as well as for the adjustment of the necessary pad which has to be constantly worn. I admit that an artificial anus in the abdominal walls anteriorly can be kept clean more conveniently by the patient than one in the loin; but the former situation, owing to the recession of the abdominal walls in certain positions assumed, allows the pad to shift. This is not the case in the loin, as the latter offers a more fixed and stationary point to retain the pad.

3. Those who prefer the iliac operation claim that, owing to the meso-sigmoid being longer than the descending meso-colon, it renders the stitching of the bowel to the edges of the wound easier; also, that there is less tendency to prolapse of the gut following this than the lumbar operation. I confess that the long sigmoid meso-colon will permit of the bowel being drawn up much further than will the comparatively short descending meso-colon. This offers, however, no advantage over the lumbar operation, as the length of the descending meso-colon is such as to allow the surgeon to bring the bowel up far enough to suture it to the edges of the wound of the abdominal walls, before or after it is opened, without any difficulty. In the case of a very fat subject, where the abdominal walls are flaccid, the last stages of the lumbar would be somewhat more difficult than that of the iliac operation.

The formation of the spur, the barrier to the passage of the contents of the intestine from the upper into the lower opening, is claimed as being more pronounced after the iliac than the lumbar operation. This has not been so in my experience; on the contrary, I have been very much disappointed with the iliac operation in this respect. True, I have only performed two of the iliac operations; in both of these the patients were greatly annoyed by the collection of feces in the rectum above the seat of the trouble, and the consequent rectal tenesmus excited by the same. In my lumbar colotomies, by following the plan adopted by Mr. Bryant, namely: Having exposed the descending colon by an incision carried in the line of the normal crease situated about midway in the costo-iliac space—the structures

divided being the skin, the superficial and deep fascia, the posterior border of the external oblique, the anterior border of the latissimus dorsi, the lumbar fascia with the posterior borders of the internal oblique and transversalis muscles, and the anterior border of the quadratus lumborum and the fat covering the posterior surface of the bowel, which should be separated by the fingers—it is grasped at the site of the posterior longitudinal muscular band, rotated well forward on its longitudinal axis, brought into the wound, and there fixed. Operating in the above manner, I have formed a most excellent spur, serving its purpose very satisfactorily to the patient as well as to myself. I would restrict the iliac operation to that class of cases where the upper portion of the sigmoid flexure is not involved, and where it is done first as an exploratory measure—not in a diagnostic sense, but for the purpose of determining whether resection is justifiable, when, if it be impossible, the operation is completed as an iliac colotomy. In the two iliac colotomies that I have performed, the cases not being urgent, I divided each operation into two stages; the first consisted in fixing the bowel in the wound (colorraphy), and the second in opening the bowel at the end of seventy-two hours. It is not necessary to give an anæsthetic when the bowel is opened, it being almost painless. I follow this course in the lumbar operations as well, when the urgency of the cases does not demand an immediate opening.

Indications for the operation: Carcinoma of the rectum, either in the form of a growth or a stricture, too high to render the removal through the perineum or back by excising the coccyx, and, perhaps, one or two of the lower segments of the sacrum, or through both the perineum and the back.

Stricture of the terminal part of the sigmoid flexure and of the upper part of the rectum with symptoms of obstruction, too high to treat successfully by dilatation, divulsion, or division.

Incurable cases of recto-vaginal or recto-vesical fistula. Extensive and otherwise incurable cases of ulceration of the rectum, making life a burden to the patient.

Imperforate anus, where operation through the perineum and back proves of no avail.

Irremovable growths of the pelvis, causing obstruction by making pressure upon the rectum. In this connection, I will make mention of a suprapubic cystotomy that had to be done by a colleague in one of our hospitals for retention of urine, occasioned by pressure of such

a growth against the base of the bladder. Here it was only possible to pass a catheter when the patient (male) was anæsthetized.

When should the operation be done? I believe the position held by most surgeons in regard to the operation of colotomy, namely, that it is only to be thought of as a last means of relief in cases of carcinoma of the rectum and sigmoid flexure, also in strictures of small calibre, otherwise incurable, is a too conservative one. We must all admit that the chief factor in the rapid growth of carcinoma involving the bowel is the irritation to which it is constantly subjected, first, by the peristaltic action of the bowel, and, secondly, by the passage of fecal matter through the involved portion; therefore, the position I maintain is, that the sooner the operation is done, there being, of course, no doubt as to the character of the trouble, the better, and for the following reasons: First, by the early establishment of an artificial anus, the patient is relieved of the severe pain caused by the contraction of the enfeebled bowel in attempting to expel its contents; to relieve this, it is necessary to administer anodynes which interfere with digestion and assimilation. Second, the diarrhœa, so frequently a common symptom in these cases, does not occur. Third, the danger of total obstruction, one of the causes of death in unrelieved cases, is prevented. And, lastly, the opportunity afforded of subjecting the affected bowel to frequent antiseptic irrigation, by which the progress of the disease is very materially stayed. I am convinced that in the case of lumbar colotomy I here report, showing a drawing of the artificial anus, by frequently washing out the lower bowel with a one-half-per-cent. solution of creolin (preventing the collection of the excretions of the growth, which cannot be done thoroughly until an opening is established with the bowel above the seat of the growth), as has been done conscientiously by my resident surgeon, Dr. C. D. Hamman, the patient's comfort has been greatly added to; also, that the progress of the growth since the operation has been but little, if any.

Thus far, I have spoken simply of left lumbar and left iliac colotomy. Owing to the modern advancement made in intestinal surgery, right lumbar and right inguinal colotomy are operations, I hope, of the past. I trust, at this time, no surgeon who is abreast with the times would think of either of the two last-mentioned operative procedures, but would open the abdomen of his patient, remove the growth—if possible, by resection—and reëstablish the continuity of the canal, either by lateral implantation, or, better, lateral apposition by perforated decalcified bone plates or rubber

rings. Where it is not possible to remove the growth in the cases last referred to, sooner than establish an artificial anus, make a lateral anastomosis.

In carcinomatous disease of the upper portion of the rectum, colotomy offers the only operative means of relief. In carcinomatous disease of the sigmoid flexure, or of the descending colon, too high for colotomy, lateral anastomosis by ileo- or colo-rectostomy may be feasible, but here I give preference to lumbar colotomy; elsewhere I prefer anastomosis.

James R., hostler, aged thirty-eight years. Admitted to the German Hospital July 26, 1890. Family history negative. Has had pain on defeca-

FIG. 1.

Showing the artificial anus. The two openings drawn apart so as to bring out the spur.

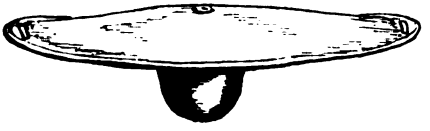
tion, and discharge of blood-stained matter. On examination, an ulcerating mass was found high up in the rectum, involving the entire calibre of the gut.

August 16. Left lumbar colorraphy performed.

17*th*. Considerable tympanites.

18*th*. Gut opened; immediate relief from tympany. Wound was dressed twice daily. Primary union. Patient discharged September 6th.

FIG. 2.



Pad.

The patient was able to regulate the movement of the bowels at the end of two weeks. He improved markedly in health and strength.

FIG. 3.

Showing pad adjusted.

December 17. Patient has been doing light work as a hostler for six or eight weeks. His bowel is washed out twice a week with a one-half-per-cent. solution of creolin.

DISCUSSION.

DR. JOHN H. PACKARD: I would call attention to one important point as to the distinguishing between large and small intestine, which I do not think was mentioned by Dr. Deaver. It is that the small intestine moves with respiration, while the large bowel does not.

Opening of the peritoneum is, of course, to be avoided, if possible. Yet, when it does occur, it is not a matter of very serious consequence. I have had it happen in my hands in a case where the bowel was contracted, and could not be found; I simply caught up the wounded part and tied a catgut ligature tightly round it, and never heard from it again. In this case I operated again at a later date, opening the cæcum in the right iliac region; the patient had her evacuations satisfactorily for a number of months through this orifice.

I have seen a surgeon embarrassed in the lumbar operation by a large cyst of the kidney, which presented in the wound, and had to be evacuated before the bowel could be found.

As to the greater convenience of the patient when the artificial anus is in front, I do not feel that we can as yet judge, from the small number of recorded cases of this kind. My own experience has been almost entirely with the lumbar operation, and has been very favorable. In one case, operated upon three years ago, the woman is still living, and able to do something toward supporting herself.

As to operations on fat subjects, it does not seem to me that there would be less difficulty in drawing out the bowel in the iliac region than in the lumbar.

Dr. Deaver did not, I believe, mention the extent of the opening to be made in the intestine. If this is too large, there is apt to be, not only incontinence of feces, but also an eversion of the mucous membrane, which becomes very tender, and discharges an irritating secretion. It is true, the orifice tends to contract, but if it becomes too small, it can always be enlarged.

I would ask why, in the iliac operation, it is considered proper to wait seventy-two hours before opening the bowel? The serous surfaces become glued together in a much shorter time; and should the intestine become distended, the adhesions formed might be pulled apart.

I agree with Dr. Deaver in the opinion that there are cases in which the operation should be done early. Patients with malignant disease of the rectum are sometimes allowed to go on suffering, when they could be relieved by surgical interference. So much comfort is given by lumbar colotomy that I have operated on a man who was *in extremis*, to save him pain, just as I would in some cases perform tracheotomy to relieve urgent dyspnœa.

In cases of imperforate anus or rectum the question between the iliac and lumbar operations is important. I think that here the former is the better; the peritoneal surfaces in a child will adhere with great rapidity, and the bowel is very accessible. We are in this procedure close to the seat of trouble, if further measures are to be adopted for restoring the natural channel of the anus.

It seems to me that it might sometimes be an advantage to bring the inner wall of the bowel out to the wound, in the lumbar operation, so as to close off the lower portion of the gut altogether, and prevent any portion of fecal matter from passing down so as to come in contact with the diseased surfaces.

Let me ask, in conclusion, whether there is upon record any instance in which a portion of the lower bowel, affected with malignant disease, has been resected with good result, with such success as might lead me to recommend a like operation in the case of a friend, or to consent to its performance upon himself.

DR. JOSEPH HOFFMAN: I have now a case of cancer of the rectum in a woman, sixty-five years of age, where I have refused to do colotomy, because the disease is in such a condition that life cannot be prolonged over a few weeks. From what I have seen of these operations, I look upon them more as curiosities than as accomplishing much good. I do not believe that the prolongation of life for three or four months in the presence of suffering, simply because it is possible, is always a justifiable procedure. I have in mind one case which I attended after colotomy was performed where the woman went on from bad to worse, finally begging me to give her something to end her misery. If the operation had not been done she would probably have died a much easier death. As an adjunct to the treatment of diseases of the lower bowel, amenable to treatment, the value of colotomy is not disputed.

The shutting off of the lower portion of the intestine is referred to by Treves as a procedure which, to a great extent, prevents the bulging of the intestine after the operation is performed.

DR. H. R. WHARTON: I think that often the inguinal operation is simpler than the lumbar. The incision that I have employed is one recommended by Mr. Ball, an Irish surgeon; it is made in the line of the linea semilunaris, and is two to three inches in length.

As regards prolapse of the bowel, I think that there is little difference in the two operations. I have seen marked prolapse after the inguinal operation. To prevent this it has been proposed to drag the bowel well down, and remove the redundant portion at the time that it is secured.

In regard to the best operation in imperforate anus or rectum, experience has shown that the lumbar operation is difficult, and that it is uncertain on account of the tendency, in young children, of the descending colon to be displaced. In a number of instances the operation has had to be abandoned on this account. Inguinal colotomy is the better operation in these cases.

As regards the time at which the gut should be opened. If the symptoms are urgent, the surgeon should open the bowel at the time of the operation; if the symptoms are not urgent, he should allow twelve to thirty-six hours to elapse before opening the bowel. The accumulation of feces below the opening is, in many cases, a troublesome feature. In inguinal colotomy the collection can be cleared away through the artificial anus, and this is one of the advantages of the inguinal operation.

DR. DEAVER: While under the present methods of surgery there is not much risk from opening the peritoneum, yet we should avoid it where

possible. From what has been said in regard to the inguinal operation in cases of imperforate anus, I think that it will be better in these cases.

In regard to the propriety of the operation, I have only to say that good men have done the operation for years, and I am inclined to follow their example. What should be done to Dr. Hoffman's case is lumbar colotomy. The diarrhœa, pain, and hemorrhage in cancer of the rectum is such as to make the sympathetic surgeon shrink.

In the formation of a spur, I have adopted Bryant's plan, which consists in rotating the descending colon well forward, so that the posterior wall projects to the extent of half an inch. This offers a sufficient barrier to the passage of feces.

TRAUMATIC ENOPHTHALMUS.

By GEORGE FRIEBIS, M.D.,
CHIEF OF OPHTHALMIC CLINIC, JEFFERSON MEDICAL COLLEGE HOSPITAL.

[Read March 11, 1891.]

THE fact that traumatic enophthalmus is a rare condition of the eye would alone justify a contribution to the history of this subject, although the record of the case which I am about to read possesses sufficient interest of itself to encourage me in asking your kind attention for a short time. I would further add that this case was deemed of sufficient importance by Professor Thomson to present at one of his clinics, and was dwelt upon at some length by him.

George B. H., aged forty-two years, a stableman in the employ of Adams's Express Company, residing in Trenton, New Jersey. He was kicked in the right eye on October 19, 1889, while trimming the fetlock of a horse. He remained in an unconscious condition for three-quarters of an hour. Upon his regaining consciousness it was found that the upper lid of the right eye had been cut upon the inner surface. He had received a severe contusion on the right side of the top of the head, and complained of severe pain in his right side.

The physician summoned sewed and bandaged the wound, after which the patient was taken to his home and put to bed; after getting into bed he became very cold. Small heated pillows filled with sawdust and salt were placed about him, and in a short time he grew warm, when he was seized by nausea, vomiting a quantity of clotted blood. Next morning he arose at the usual time, but remained in the house until permitted by the physician to go out. After the swelling had left the eye, so that the patient could pull the lids open sufficient to see at all, he found that when using both eyes he saw double every object at which he looked. Furthermore, there was complete insensibility of a portion of his scalp, extending over a space of one to two inches wide, and from the crown of the head to the right eye.

Subsequently, when this man came under observation on November 26, 1889, at Jefferson Medical College Hospital, two weeks after the accident, the following conditions were found to exist: The palpebral fissure was narrowed to about one-half its normal dimensions (the normal separation being about one-half inch), the lids were red, and the upper lid much retracted,

forming the characteristic pocket-like retraction of enophthalmus mentioned in Graefe and Saemische's *Handbook of Ophthalmology*.

There was a scar about one inch in length above the eyebrow, extending outward from the supra-orbital notch.

The eyeball upon inspection was found to be normal in tension, but apparently smaller than the left one, which was due to the retraction. The pupil was dilated, and but faintly responsive to light stimulation. Further investigation proved that slight paresis of accommodation existed, also paresis of the internus and inferior rectus muscles. The cornea was clear, iris dilated, lens transparent, and its position normal.

From the patient's statements I am convinced there must have been more decided impairment of accommodation immediately after the injury, because he said when he recovered consciousness entirely objects appeared to him, when closing the left eye, as though enveloped in a fog. There was loss of sensation on the right fronto-parietal region to the extent of one and a half inches from the middle line to the temporal region, and about two inches anteriorly from the coronal suture, showing that the first branch of the fifth nerve was likewise implicated. There was some impairment of the facial nerve, as he could only with difficulty slightly raise and corrugate the occipito-frontalis muscle.

There was mobility of the eyeball in every direction, which proved that the muscles of the eyeball were not incarcerated in the fracture of the orbital bone (which was diagnosed by the physician first in attendance), or bound down by inflammatory adhesion, though crossed and vertical diplopia existed.

This was found to be due to a marked paresis of the internus and inferior rectus muscles. The ophthalmoscopic examination revealed some haziness of the vitreous; the fundus was found to be normal; the motor or sensory impairment was due to peri-neuritis; vision for distance was $\frac{20}{LXX}$, and he could read Snellen's No. 1 at fourteen inches: showing only a moderate diminution of accommodation, which doubtless had been more pronounced immediately after the injury.

Upon general principles iodide of potassium was administered, in doses of five grains, three times daily, with the following result: One week after date of first examination vision for distance had improved to $\frac{20}{L}$ imperfectly.

There was no material improvement of accommodation upon the last test, but sensation was considerably restored, as shown by the æsthesiometer, the paretic space being diminished to a very small area. The cicatricial lesion already observed in the supra-orbital region was not bound down to the osseous tissue, but freely movable. That the fracture of the infra-orbital bone had occurred at the time of injury was evident because of the free vomiting of blood after the patient had recovered consciousness, and from the continued hemorrhage from the nose for three or four days after, when the patient sneezed, or attempted to blow his nose. After a term of treatment, extending over six weeks, the patient had recovered from his diplopia, accommodation was restored, and the retraction of the eyeball had disappeared,

vision in the right eye had been brought up to $\frac{20}{XXX}$, and a low degree of astigmatism being corrected, vision was restored to its normal standard.

The last ophthalmoscopic examination revealed the vitreous body and the fundus to be normal.

In the record of this case I have intentionally refrained from referring to the bibliography on the subject involved, because, limited as is the history of these cases, it was amply investigated and fully brought to light some time ago before this Society by Dr. Hansell, in an article written upon a case somewhat similar that had been operated upon by Professor Keen. In one particular, however, his case differed materially from the one cited by me: in Professor Keen's case, if my memory serves me right, the muscles of the eyeball of the patient were incarcerated in the fracture, and bound down by inflammatory adhesion, and the mobility of the eyeball was not restored.

Graefe, Saemische, and other authorities agree that the retraction is due to disturbance of nutrition of the orbital tissues, consequent upon traumatism leading to temporary absorption of the cellular and fat tissues of the orbit.

The case is a remarkable one, considering the violence of the injury in contrast with the happy recovery.

In such cases we are usually prepared to look for a serious impairment of the integrity of the eyeball; as, viz., the rupture of the eyeball, dislocation of the lens, partial or complete detachment of the retina, and intra-ocular hemorrhage. Not any of these conditions mentioned existed in this case.

NEPHRORRHAPHY FOR FLOATING KIDNEY.

By JOHN S. MILLER, M.D.

[Read March 11, 1891.]

NEPHRORRHAPHY is now recognized as a justifiable surgical procedure for the repair of floating or movable kidney; at the same time this operation has not been performed sufficiently often to furnish complete statistics as to its value as a permanent remedial procedure.

The following case, therefore, is offered largely for its statistical value:

Mrs. A., American, aged thirty-two. Has had two living children and one miscarriage. Until three years ago she enjoyed excellent health. At that time she began complaining of severe pain in the back, mterorrhagia, and other attendent symptoms of ovarian trouble. This condition lasted until the 20th of August, 1890, when both ovaries were removed at the Woman's Hospital in this city. She was relieved of many of the ovarian symptoms, and particularly the severe hemorrhages. The pain in the back and in the right lumbar region, however, still continued, and gradually became more severe. Soon after her discharge from the hospital she complained of abdominal dragging pains, a sensation of something pulling or moving about in the abdomen; particularly was this noticeable when assuming the erect posture, or after unusual exertion. She was unable to lie on her right side or turn in bed without incurring excessive pain; the erect position affording most relief. For days the secretion of urine was very scant, coincident with which severe colicky pains were present in the right lumbar and right epigastric regions. The urine at this time was not examined, although the patient complained of smarting pains on voiding it. Her suffering at this time was so extreme that she frequently wished for death. Various pads and mechanical appliances were used without any remedial effect.

About the 1st of October, during a severe paroxysm of pain, the patient's husband, while rubbing her abdomen, discovered a rounded mass about the size of an orange on her right side. I was then consulted in the case for the first time, and elicited the above previous history. On careful examination I found a tumor about two inches to the right of the umbilicus, the shape and size being suggestive of a kidney which was very movable, and changed

its position with the movements of the patient. When she lay on her right side, the mass moved freely past the median line; on her standing erect it dropped about three or four inches. Palpation of the tumor produced exquisite pain and nausea. The examination was facilitated by the emaciated condition of the patient, and the lax condition of the abdominal walls.

The diagnosis of floating kidney was then made by exclusion. Both ovaries and tubes having been removed, a cystic condition of these organs was excluded. The absence of icterus, the normal condition of the stools, the shape and mobility of the mass, the extreme tenderness, and the character of the pain produced on pressure of the tumor, precluded the possibility of distended gall-bladder. The fundus of the extended gall-bladder is often freely movable in a lateral direction, and can be pushed across the left of the middle line. This condition was not present. Mesenteric tumor, or malignant disease of any of the abdominal organs, was not tenable, by reason of the absence of cachexia and other recognizable diagnostic signs. At this time the urine was carefully examined and found normal. It was then assumed that the kidney was in a healthy condition, and nephrorrhaphy was determined upon.

OPERATION.—On October 8th the patient was etherized, and placed in the modified Sims's position with a small firm pad placed under the left side. A lumbar incision about four and a half inches in length was made on the right side parallel with and three-quarters of an inch below the last rib. The muscles were divided in layers, and the wound widely separated by suitable retractors. At the suggestion of Professor Keen, the ileo-hypogastric nerve was divided, as it seemed to interfere with the manipulation of the kidney, but at the time I misunderstood him, and supposing that he merely suggested the division of the nerve for working convenience, I did not resect the nerve for the purpose and in the manner first spoken of by him in his exhaustive article on "Nephrorrhaphy" in the *Annals of Surgery*, Aug., 1890, in which he says:

"One source of discomfort, however, I have found very marked in two cases, and Weir has alluded to the same trouble. The incision crossed the path of the ileo-hypogastric nerve, and in the case alluded to the patients complained of a great deal of pain in the hip and groin of the corresponding side, which I presume was due to the injury of the nerve. As the nerve is entirely one of sensation, if I again found it in my path, and exposed to probable injury, I should divide it and exsect two or three inches. The local anæsthesia which would follow, I believe is of no importance, but the pain which sometimes follows is a serious inconvenience to those in whom it has existed."

To continue: The cut ends of the nerve were pushed aside. The peri-renal fat was torn through with the fingers, when the absence of the kidney from its normal position at once confirmed the diagnosis. Great care was observed not to open the peritoneal sac. The tumor was found on the left side beyond the median line.

By manipulation through the abdominal walls the kidney was, with some difficulty, made to move up under the diaphragm, and readily assumed its normal position. It was then seized by volsella forceps, and dragged opposite the incision. The excessive peri-renal fat was trimmed away so as to

bring the kidney in apposition with the deep lumbar fascia and muscles, hoping thereby to secure firmer union. A curved needle, armed with No. 10 black silk, was then passed through the deep muscular structures into the substance of the kidney, and brought out on the opposite side of the incision; a second such stitch was then passed two inches below. The cut ends of the ileo-hypogastric nerve were then united by a single catgut suture. The amount of manipulation was deemed sufficient to promote inflammatory adhesion without other mechanical irritation of the capsule. After being thoroughly flushed with boiled water, these deep stitches were tied and the ends brought out at the upper and lower angles of the wound. The different muscular layers were then united in tiers with catgut sutures. Superficial stitches were introduced along with a small drainage-tube, and the wound was dressed with bichloride gauze. Her temperature at no time rose above 99½°. The pain resulting from the division of the nerve and the suturing of the kidney was so great that hypodermic administrations of morphia were deemed necessary in large and frequent doses. The pain continued for forty-eight hours.

Twenty-four hours after the operation I made a chemical and microscopical examination of the urine, and determined the presence of blood in considerable quantity. On the following day the blood was absent from the urine. The patient was now able to assume the recumbent position without the pain and inconvenience which she had experienced prior to the operation.

Without the aid of purgatives the bowels were moved on the third day after the operation, and the stool was found to be normal in both color and consistency. The patient was kept on light nourishing diet, and on her back for four weeks. The wound healed by first intention, the dressing being changed but once during the entire treatment. The deep silk ligatures came away during the latter part of the second week and no sinuses resulted.

On the final removal of the dressings, no tumor nor sensitive spot could be found in the entire abdomen. The patient is now (nearly six months after the operation) in perfect health, has gained forty-five pounds in weight, and can attend to her household duties.

That the subject of the method of fixation of floating kidney is still unsettled is demonstrated by the various methods proposed. Some authorities simply pass the ligatures through the peri-renal fat and hope thus to secure the organ. Others scarify the capsule and pass the ligatures through the capsule, and claim good results from this procedure. The most advanced, and, from a statistical basis, the most reliable method, is that of passing the sutures through the cortical portion of the kidney.

Catgut would be the ideal ligature if trustworthy; but not only is there the danger of sepsis from an imperfectly prepared ligature, but also from its unreliability as to the time of absorption. If absorbed before firm union has taken place the operation is futile, and it is in the first two weeks that the most failures occur. Silk, properly prepared,

is undoubtedly the best material for this purpose, and possibly such a non-absorbable material might, by its presence, provoke a most desirable irritation which would favor thorough adhesion.

In reply to a communication as to the frequency of floating kidney found during autopsies, Dr. Formad writes the following:

"Floating kidney is certainly quite a common thing in women. A certain degree of looseness or mobility of the right kidney in woman is constant. I have, from observations upon a couple of thousands of autopsies on *women*, found that the floating kidney is only a higher degree of that normal mobility of the right kidney peculiar to women. I have never noticed the right kidney so firmly fixed to its position as is the left. In the *male* I have noticed the left kidney nearly floating on a few occasions—never the right."

DISCUSSION.

DR. W. W. KEEN: I was happy to be present when Dr. Miller did this operation, and I am still more pleased to hear of the admirable results. The facts that the patient has been entirely free from pain and that she has gained health and strength, and forty-five pounds in weight, are admirable testimony to the usefulness of this procedure.

Within a week I have seen a patient on whom I did a nephrorrhaphy fifteen months ago. Her condition has much improved since the operation, although she has not gained in weight as much as the patient of Dr. Miller Three weeks ago I received a letter from a patient on whom I did a nephrorrhaphy in the Jefferson College clinic just one year from the day she wrote me. She wrote wishing to thank me earnestly for the great benefit she had received. A third case, that of a physician, whose case I reported to the American Surgical Association one year ago, I have heard from recently. In this case the patient had lost much flesh, and had large quantities of pus and blood in the urine. At the operation nothing was found but the floating kidney to account for the condition. This patient is now entirely well. A fourth case I operated on nearly three years ago in the Woman's Hospital clinic. I heard from her not long since, and she was remarkably well—had regained her health entirely. This is a report of the four cases in which I have done nephrorrhaphy. Not only has there been no failure, but, on the contrary, the operation has been a remarkable success, after a period long enough to assure us, I think, of its permanence.

In regard to fixation of the organ: I have not adopted the method which Dr. Miller has used, of passing two deep stitches which were subsequently removed. I have invariably used silk and buried the sutures, employing three or four both through the anterior and through the posterior lip of the incision, passing the stitches directly through the substance of the kidney. Dr. Miller's result seems, however, so far as a single case can, to justify the means employed. At the same time I would trust sutures that were left for

an indefinite period rather more than sutures left only two weeks. I have thus far seen no reason to regret leaving the sutures.

In regard to division of the nerve, I have in two cases found excessive pain in the right hip and right groin, the consequence, apparently, of the slight unavoidable injury to the nerve in the necessary manipulation of the operation. In one of these cases the nerve did not seem to have been injured, although it was in plain view. In another case I should try excision of two or three inches of the nerve, and see if that would not prevent the severe pain.

DR. JOHN B. ROBERTS: I have had perhaps half-a-dozen cases referred to me in the last five years in which the question of nephrorrhaphy was considered. I must say, that in all the cases that I have seen, with, perhaps, the exception of two, it has seemed to me that there were so many other conditions which possibly added to the discomfort of the patient that I could not make up my mind that the mobility of the kidney was the cause of the difficulty. I think that we should make a distinction between a merely movable kidney and true floating kidney, where the kidney makes excursions throughout the abdomen in various directions. Some months ago I saw at the Woman's Hospital a case which had been operated on some eight or ten months ago by Dr. Dennis, the well-known surgeon of New York, in which, however, the kidney was movable at the time I saw it. I have not found out whether that was a case in which sutures were employed, or whether the surgeon was satisfied with simply irritating the surface of the kidney. In that case we determined to wait for a while and see if the symptoms disappeared under non-operative treatment. In the meantime the patient disappeared.

Day before yesterday I saw a patient on whom I had declined to operate in September because there were so many other intestinal and nervous symptoms that it did not seem to me that the kidney difficulty was with the one which was producing the annoyance. That patient still has discomfort, and it is possible that in the course of a few months I shall do a nephrorrhaphy. I was interested in one case in which abdominal section was done by Dr. Fullerton for pelvic trouble. The patient had a history of floating kidney, and with our hands in the abdomen the organ could be felt floating among the intestines. One other case which might have required a nephrorraphy is that of a boy whom I saw a number of years ago with Dr. O'Hara. He had paroxysms of suppression of the urine with great pain, and the appearance of a tumor in the left hypochondrium. The diagnosis was floating kidney, probably congenital, and that the ureter occasionally became twisted. I believe that the great pain was due to the distention of the pelvis of the kidney with urine, and that this led to the appearance of a tumor. I recommended a retaining apparatus, and suggested that subsequently we might consider the propriety of nephrorrhaphy. Dr. O'Hara told me not long ago that the boy had now very few attacks, and was in sufficiently good health to put aside the thought of operation. In such a case, if the condition continues, it would be proper to perform nephrorrhaphy. In the majority of women with movable kidney, however, unless true floating kidney, there are usually so many other causes of ill-health that it is difficult to decide as to the necessity of operation unless you can follow the patient for a few months.

Perhaps I am a little over-cautious, but I do not like to operate until I am sure that I am operating on the right organ. The operation is, however, certainly one of very slight risk.

DR. JOHN B. DEAVER: The operation of nephrorrhaphy is now a well-recognized procedure. I would say that it is not my experience to have silk ligatures come away. Without criticising the Doctor's work, I think the reason the sutures came away was that there was faulty asepsis. I believe the success of the operation depends largely upon the manner in which the stitches are introduced into the kidney; they should be passed through the cortical substance. I recall a case which occurred in the early part of the history of the surgery of the kidney where the stitches were passed through the capsule and attached to the muscles. The kidney again became displaced, and the patient insisted upon its removal. The operation of nephrectomy was done with success. In my judgment it is not sufficient to simply scarify, or only go so far as to take up the peri-renal fat. I would prefer aseptic silk to catgut. Improperly prepared catgut is often the source of septic poisoning of wounds.

I do not know whether or not Dr. Miller brought out in his paper the question of a meso-nephron. This has always interested me. I have never come across this reflection of the peritoneum in the dissecting-room. I have no doubt, however, that it does exist; but it is rare to find the peritoneum carried so far anterior to the kidney as to constitute a meso-nephron in the sense that the peritoneum which holds the intestine constitutes the mesentery. I have dissected a case of floating kidney, but failed to find a meso-nephron.

DR. DE FOREST WILLARD: The sutures are the essential element in holding the kidney in position. It is a question, however, whether carrying the sutures through the substance of the kidney really acts better than carrying them through the capsule, as the pressure of the suture upon the soft substance of the kidney quickly cuts through, so that it is really the capsule that is the retaining structure. If it should be proven that the introduction of the needle and suture through the substance of the organ does incline to subsequent nephritis, we can fall back very confidently upon the capsule as the retaining power.

DR. ROBERTS: It would be interesting to hear from Dr. Fullerton the condition of the patient at the time she was in the Woman's Hospital.

DR. FULLERTON: The patient came into the hospital for uterine hemorrhage, supposed to be due to an imperfect abortion. She had been bleeding profusely for four weeks. On examination masses were found on each side of the uterus, which were extremely tender. The diagnosis was made that the patient was suffering from pelvic peritonitis. She was in the hospital for several days before any operation was attempted. Curetting, which had at first been thought of, of course was not done under the circumstances. Abdominal section was resorted to, and a hæmatosalpinx was found on one side (the mass being about the size of a hen's-egg), and a hydrosalpinx on the other. It was thought probable that there was an extra-uterine gestation. The patient made a good recovery from the operation. Before she left the hospital there were some symptoms of renal trouble, but it was not easy to make an examination on account of the thickness of the abdominal walls. We did find a mass in the abdomen, I believe, but I do not remember that we actually diagnosed floating kidney.

ARTERIO-CAPILLARY FIBROSIS.

By AUGUSTUS A. ESHNER, M.D.

[Read March 11, 1891.]

Every cell inherits from its parent cell a certain lease of life, at the end of which physiological death occurs. This period, however, may be influenced by external conditions. Premature death is pathological. We cannot recognize a pathological longevity. Similar laws apply to the human individual, the composite of a vast aggregation of cells of widely differentiated function.

The life of man may be divided into three periods: that of evolution, of growth, of development; that of maturity, of perfection; and that of involution, of decline. The first begins with birth, the last ends with death.

During the period of growth and development, tissue-change and destruction—catabolism—are more than offset by tissue-construction and repair—anabolism. Nutrition exceeds waste. Building-up is more active than tearing-down. With the activity of life comes the demand for the highest differentiation of function of which the organism is capable. This represents the perfect individual. For a time, a condition of equilibrium is maintained. Sooner or later, however, the tide begins to turn. The equilibrium is disturbed. Waste exceeds repair. The cellular assimilative function becomes impaired, the constitution of the nutritive fluids defective. Tissues and organs are imperfectly furnished with the materials for their maintenance. Vascular changes occur. In a vicious circle, one baneful influence reacts upon another. The entire organism is reduced to a condition of deterioration. Finally, the state of nutrition falls to so low a level as to be insufficient for the purposes of life, and functional activity comes to a standstill. This is the physiological process, as it occurs at advanced age, and constitutes the condition of senility. Occurring at an earlier period, however, the process becomes pathological, recog-

nized clinically by signs and symptoms which may be conveniently included in the designation premature senility.

As the component parts of the organism depend for their sustenance upon the nutritive elements of the blood, so will their functional stability be governed by the quality and quantity of the circulating medium. Thus, we would be led to look to the blood as containing the excitant which induces the earliest changes. The function of the cell once impaired, the deleterious action of the blood would be augmented by the retention of matters which it was the part of the cell to remove, and the addition of products from the degeneration of the cell.

Pathologically, the condition under discussion may be considered a general fibrous substitution and hyperplasia, displacing parenchymatous structures and narrowing the lumen of arteries and capillaries; hence the names arterio-capillary fibrosis, arterio-sclerosis.

The histological changes may arise in one of two ways, or in a combination of both. When tissue degenerates or is destroyed, nature endeavors to make restoration. The attempt is often only partially successful. The newly-formed tissue is apt to be of a lower grade than that which it replaces. The more highly organized the latter, the wider, of course, is the variance. In this way, fibrous tissue takes the place of vital structure. This is illustrated in the cicatrix, be it cerebral or cutaneous or parenchymatous. Under other circumstances, there occurs a primary hyperplasia of preëxisting connective-tissue, perhaps of a subacute or slowly chronic character, displacing the tissue proper to the organ, and finally leading to its disorganization. These two processes may be illustrated by the modern pathological conceptions of the changes that occur in certain diseases of the central nervous system. In the acute inflammatory disease known as anterior poliomyelitis, the destruction of the ganglion cells in the anterior horns of the gray matter of the spinal cord is followed by a reparative process, in which fibrous tissue replaces that which has been destroyed. In the systemic scleroses, posterior and lateral; in the degenerations, ascending and descending, primary destruction of axis-cylinders takes place, with secondary substitution of fibrous tissue. In insular sclerosis, on the other hand, there is at first an increase in the connective-tissue, followed by gradual destruction of nerve-elements and interruption of function. The difference is that between inflammation and cirrhosis. Solid viscera may be unchanged in size. They are rarely enlarged, but often shrunken, from contraction of the fibrous elements. The coats of the vessels are thickened, and their lumen narrowed. In whatever structure the process begins,

it is slowly progressive, especially if the exciting influence be maintained. The change, as it affects the arteries, is to be distinguished from atheroma, with which it may be associated. Both are evidences of senile disorganization. In atheroma, however, the process is one of fatty degeneration of the intima, giving rise to ulceration, which is in turn followed by cicatrization and calcification. In the one condition, clinically, the vessel, to the eye and to the examining finger, is tortuous and resistant; in the other, it is rigid and unyielding, like a pipe-stem. It is the difference between fibrous and calcareous infiltration.

The etiological elements concerned in the production of arteriocapillary fibrosis are comprised in the group of noxæ which we now know as toxic and infectious, and include syphilis, alcoholism, lead-poisoning, gout, rheumatism, and infectious diseases in general. Heredity, too, probably plays some part in transmitting a predisposition to the occurrence of fibrous degeneration.

Perhaps the most conspicuous symptom, and that for which the patient first seeks relief, is shortness of breath on the slightest exertion. The onset of this condition is so insidious that the patient is unaware of its existence, until suddenly revealed by a demand for some special activity. With it is often associated palpitation, which the patient is apt to describe as a fluttering of the heart. The cardiac action is found to be irregular, perhaps intermittent, with occasional duplication of the second sound or an abortive first. The second sound is distinctly accentuated at the base. The pulse is tense and resistant. The temporal arteries are prominent and tortuous. In addition, the patient complains of coldness of the extremities or of numbness or of formication, with, perhaps, some muscular weakness. There may be vertigo, especially on sudden changes of posture, lightness in the head, as the patient says. The memory is impaired, and there may be headache. The knee-jerk is frequently exaggerated, but not always. Often there is tremor, and sometimes nystagmus. In some cases, the complexus of symptoms approaches that seen in insular sclerosis, in others that seen in paralysis agitans, though typical of neither. It may be that such cases represent incipient stages of the one or the other of these affections, which, in their turn, perhaps, may be more intimately related than we as yet know. Occasionally, we meet with transient pareses and local paralyses, sometimes ascribed to uræmia. It seems easier to explain the occurrence of these on the assumption of partial vascular occlusion. The feet are sometimes

swollen. There is apt to be increased frequency of micturition of a urine of low specific gravity, but rarely containing albumin or casts.

The train of symptoms here outlined may be readily explained by the pathological lesion. How common it is at autopsies to find organs the vessels of which gape with open mouths, while, during life, the only condition determinable was such an association of symptoms. It is neither nephritis nor arteritis, neither myocarditis nor cerebritis, but a diffuse fibroid change, the manifestations of which are perhaps most patent in the small arteries. Thus, we see associated with this condition miliary aneurisms in the brain, which we now know to be so generally antecedent to cerebral hemorrhage. In the absence of aneurism, the vascular fibrosis may alone act as a predisposing cause of rupture. The narrowing of the cerebral capillaries may become so marked as to permit of the formation of thrombi *in situ*, thus explaining certain cases of hemiplegia in which cardiac lesion or other source of embolism cannot be detected. It is also probably in the thickening of the wall of the capillary and the narrowing of its lumen that certain cases of transient or permanent loss of power, in which the severity of the symptoms soon abates, may find explanation. The derangement of cardiac function is a result of defective nutrition and innervation. The shortness of breath is brought about by the cardiac incompetency, by the vascular changes in the pulmonary structures, and, finally, by lowered innervation, in some cases aided by concurrent emphysema. Other visceral symptoms are due to changes of a similar nature in the respective organs. The extremities are cold because the blood-supply through the narrowed vessels is imperfect.

In the consideration of the treatment of this condition, not much need be said in the way of prophylaxis. "All the medicines in the world will not replace right living." It is the secret of longevity.

In the general management of the case, the individual is to be directed to lead a tranquil life, to avoid excitement and undue physical exertion, to partake of a light, nutritious diet, which, with benefit, may include a liberal supply of milk, and to take an occasional saline laxative.

Of medicaments, I have personally had the most gratifying results from the administration of nitroglycerin, in combination with digitalis when the cardiac action is feeble or its rhythm disturbed. Nitroglycerin is a diffusible stimulant, causing dilatation of the peripheral capillaries, thus permitting a flushing of the tissues with arterial blood, and promoting nutrition. By diminishing the resistance in the vessels, the demands upon the heart are lessened, while this organ, being

better nourished, is more competent to carry on its functions. Beginning with one minim of a one-per-cent. solution, three times a day, the dose is progressively increased one minim every second day, until physiological effects—flushing of the face, sensation of a band around the forehead, headache, and dizziness—are observed. Probably the most appropriate menstruum is spirits of nitrous ether, the action of which, as a nitrite, is synergistic. In administering digitalis, I like to prescribe two to five minims of the tincture in two drachms of the infusion, in this way obtaining the benefit of all the principles of the crude drug soluble in alcohol and in water.

Strychnine and atropine may prove useful adjuvants in the treatment. Under certain circumstances, it may be desirable to substitute strophanthus for digitalis. Caffeine or cocaine may fulfil certain indications. Cod-liver oil might be used as a nutrient, alcohol as a stimulant. Iodide of potassium is of doubtful utility, except during the active stage of syphilis.

The conclusions I wish to record are: That there is a pathological condition in which the manifestations of senility occur prematurely, and that the best means of combating it is by improving the general nutrition and giving tone and stability to the cardio-vascular apparatus —a healthy nutritive fluid, with a competent distributing apparatus.

DISCUSSION.

DR. ERNEST LAPLACE: I was much interested in the paper. I think that a proper name for the affection under consideration would be simply arteritis. We are to remember that every tissue in the body is amply supplied with capillaries, but when we speak of bloodvessels, we must remember that these bloodvessels have their capillary. They are the vaso vasorum. There is no possibility of any evidence of inflammation taking place in the body without there having been a corresponding irritant, and if anywhere in the body, in the capillary, in the bloodvessels or elsewhere, we find a condition of fibrosis, there must have been an irritant inside of those bloodvessels affecting more especially the vaso vasorum, causing a diapedesis from the vaso vasorum into the substance of the bloodvessels, which diapedesis must have carried out a few white blood-corpuscles. These have gradually become elongated into spindle-shaped cells, and later into fibre cells. That is the life of the connective-tissue cells. Born in the white blood-corpuscles, it leaves the bloodvessels and becomes a spindle-shaped cell, and then a fibrous cell. When the cell has run through its cycle of life we have fibrosis, but to

cause this there must have been in the bloodvessels some irritant which, acting elsewhere in the body, would have caused the formation of fibrous tissue. What is this irritant? It most probably is some of the products of retrograde metamorphosis that have remained in the system, and which are specially irritant to the smallest vessels of the body—those that nourish bloodvessels. That is where this change takes place which starts a man from middle life down the hill to old age; as has been said, some of us become old before our just allowance of time is passed. That is the cause. These products of retrograde metamorphosis are allowed to remain and act as irritants in the most irritable places, which are the smallest capillaries, causing fibrosis.

DR. B. ALEXANDER RANDALL: I have been much interested in one aspect of the subject. In studying with Dr. Meigs the specimens which formed the basis of a valuable and interesting paper read before the College of Physicians, we noted some points which seemed to be in conflict with the point made by Dr. LaPlace. We noted in the large vessels, and in the veins sometimes quite as much as in the arteries, that the intima was the part most especially involved in this process. It was, to be sure, only one phase of this matter that was studied in that paper. At the same time, it involved cases both in early youth and in old age, and the parts being the relations of what we call Bright's disease. In these cases the changes were certainly almost confined to the intima of the vessels.

DR. S. SOLIS-COHEN: The subject, so thoroughly and scientifically presented by Dr. Eshner, has interested me very much from a clinical standpoint. I have seen a great deal of the affection in dispensary and hospital practice, less in private practice. There is no question but that we are often tempted to make a diagnosis of disease in some special organ, such as the kidney, heart or lungs, or wherever it may be that the brunt of the effects of capillary change has fallen, when in reality we are dealing with a general disease, to which the name of "premature old age" can be better applied than any other; even better than arterio-capillary fibrosis. In this condition there is a dissolution, a removal of some portion of the vital energy which the cell inherited from its parent cell. Whether that energy has been expended in excesses in life, or whether it has gone from privation, not because expenditure was excessive, but because income was deficient, or whether there has been some noxa which has abstracted energy by setting up a process which we may call inflammation, the ultimate result is the same. The tissues undergo retrograde changes before their time. One of the first of the clinical symptoms, in my experience, has been vertigo. A patient comes complaining of vertigo. We art apt to attribute it to the stomach, to the heart, to the eyes, to the ears, to the nose, to the medulla, to the kidneys. These may participate, but the essential change, in the class of cases now under discussion, is a loss of vital power, and the treatment must be based upon that consideration. We must remove obstacles to the flow of the blood throughout the body, and for this purpose nitroglycerin is the best of all remedies. We must add force in appropriate articles of diet, chosen with due reference to impaired digestive and assimilative functions—hence, if possible, predigested—and also to their own force-producing value—hence oily and fatty foods in judicious quantities. We must add heat, or adopt

measures to retain it, regulating the clothing, administering hot fluids, applying hot-water bags at night. We must give drugs like strychnine, atropine, caffeine, and arsenic, which enable all the energy of the tissues to be utilized; drugs, which inhibit retrograde changes. The reason why sodium iodide or potassium iodide fails in a large number of these cases, is because the change is not an inflammatory change, because there is no new-formed tissue of inflammatory origin to be absorbed, but the cells have lost their vitality, which cannot be renewed by the action of iodine. Where special indications exist, the iodides are of much use.

One of the points brought out by Dr. LaPlace is in regard to the retention of excrementitious products in the body. This fact is one of the greatest importance from a therapeutic standpoint. We must see that the excretory functions are stimulated throughout by the administration of diuretics, diaphoretics, cholagogue cathartics, and similar medicaments. Water, plain H_2O, or some of the mineral waters not too rich in mineral constituents, is one of the best cleansing agents. Medication alone does not cover the whole ground of treatment, however. Before medicating, we must reduce the labors of the patient—physical, mental, and physiological—to a point within his capacity. That is perhaps the most important feature in the treatment. In the acute attacks, or rather crises of vertigo, dyspnœa, angina thoracis, and the like, recumbency is better than all the drugs in the pharmacopœia; with the single exception of amyl nitrite in the sudden emergency. We must, of course, direct treatment against any noxa which may have helped to bring about the cellular change. As a rule, not one, but several noxæ have been at work. Among these, as already stated, are alcohol, the poison of syphilis, the poison of rheumatism, lead, tobacco, and uric acid. These often produce spasm of the minute arteries, and lead to further changes. But neither toxic agents, excrementitious products, or inflammations will explain the whole train of morbid phenomena. There is a loss of cellular energy as well, and the particular point to which I rose to call attention, a point important enough to bear restatement, is the fact that we are in our diagnosis apt so lose sight of the general condition, and to attempt to fasten upon some particular organ the responsibility for the symptoms presented.

SPECIMENS EXHIBITED.

DR. W. W. KEEN exhibited a specimen of a

TUMOR OF THE COLON, PROBABLY CARCINOMA,

which had been removed by excision of the bowel, and the continuity of the bowel restored by colo-colostomy by lateral anastomosis.

DR. S. SOLIS-COHEN exhibited

MICROSCOPIC SPECIMENS FROM A CASE OF HAIRY TONGUE.

These hair-like specimens, composed of pigmented epithelium, were removed from the surface of the tongue in a man who applied for treatment for a disease with which the tongue-condition is not connected. The affection known as "black tongue," or "*Nigrities linguæ*," was first described by Hyde Salter, and since then has been carefully studied by French, German, and English authors. It is not very common, nor can it be as rare as might be supposed. The first case recorded in this country was one that I placed on record in *The Polyclinic* for July, 1884, the patient being a syphilitic negro child. The second was also placed on record by myself at a meeting of the Pathological Society in 1887. Since then two cases have been reported by physicians of New York, and this is, I think, the fifth case recorded in this country. It is strange that three of them should have fallen to my lot to observe. The condition has always been discovered accidentally, the patient seeking advice for some other trouble. On examination the dorsum of the tongue is seen to be occupied by a group of black filaments resembling tangled hair, or, as it has been described by one writer, "a field of wheat blown down by the wind." It is not a discoloration produced by medicine, food, or other substances taken into the mouth, but an overgrowth of pigmented epithelium from the filiform papillæ. The patches vary in site and extent. There may be one or several. The natural history of the affection is that the black patch desquamates, and is thrown off. The tongue remains clear for a period of time varying between a few days and several months, even years, when the hairiness reappears. Raynaud and Dessois describe a specific microörganism as the cause of the affection. This has not always been found by other investigators. I did not find it in either of my two previous cases. This time I have secured the assistance of Dr. Coplin, who has kindly undertaken culture experiments not yet completed. Dr. J. Solis-Cohen has described the disease under the name of *glossitis parasitica*. If proliferation is to be taken as an evidence of inflammation, and we accept the evidence of bacterial causation, this name is an appropriate one. The name of melanotic hypertrophy of the filiform papillæ is the one which I suggested when presenting my earlier specimens to the Pathological Society. For ordinary every-day use, the term "black tongue," or "hairy tongue," is sufficiently descriptive. The objection to the term "black tongue" is that it has been applied in this country to a form of erysipelas.

The only symptoms possibly connected with the state of the tongue in this

case are belching and a foul taste in the mouth. But the recorded cases include all sexes, ages, conditions, and occupations—some dyspeptics and some non-dyspeptics. Sometimes there is discomfort, as of "hair in the mouth," more often there is no subjective manifestation. The only efficient treatment, in the great number of cases, has been parasiticidal. In some cases this has failed. In my syphilitic case, which was treated constitutionally, the tongue remained clear for months without any local treatment, and the case was then lost sight of.

DR. J. M. BALDY exhibited a specimen of a

FIBROID TUMOR.

We are often asked what becomes of the fibroid tumors that are not operated on. This is what became of one of them. The patient from whom this specimen was removed was a colored woman, thirty-five years of age; she had noticed this tumor for some ten years. It grew gradually for six years, and then apparently came to a standstill. I saw the case in consultation four months ago, and urged its removal. This was declined. I learned day before yesterday that the patient had died, and I secured the specimen, which presents many interesting features. It shows the method by which nature attempts to get rid of these tumors, and also what the electricians try to bring about, viz., a degenerative change in the tumor with absorption of the products. That process has taken place, in a great degree, in this tumor. The mass weighs between thirty and forty pounds. In some places, cystic cavities have formed. There is some doubt in regard to the cause of this change. I would say that this woman was treated electrically some time ago, but I am not disposed to attribute the degenerative change to the application of electricity. The change which is here present was unquestionably the cause of death. The absorption of these products led to septic poisoning, from which the patient died. It shows how dangerous these degenerative changes may become whether caused by nature or electricity.

The tumor would have been one easily removed. There were a few slight adhesions on the anterior surface. On the left side there was one band of adhesion which could have been quickly tied off. The tumor was attached to the fundus of the uterus by a pedicle of small size. There is no reason why the woman should not have had the tumor removed and recovered, except that she was suffering from another disease. The peritoneum is studded all over with nodules, whether tubercular or cancerous I cannot say at present. The lungs, heart, and kidneys were healthy. The liver was infiltrated with these nodules. It is possible that the degenerative change is due to the same cause that produced the nodules. The uterus was in a condition which we do not often have the opportunity of examining after death, viz., hypertrophic elongation of the cervix. This was undoubtedly produced by the dragging up of the uterus by the tumor.

DR. DEFOREST WILLARD exhibited a specimen of

EXCISION OF THE HIP-JOINT.

I present this specimen to illustrate one point, viz., the deceptive appearances which may exist in a femoral cartilage in which there is even a severe grade of epiphysitis.

The specimen was removed by operation yesterday, and shows the head and neck of the femur. The case is one which about a year ago showed all the evidences of commencing hip-joint disease with lameness, fixation, etc. During my absence in Europe the lad arose too soon from his bed, on which horizontal extension was being employed, and with high shoe, fixation spint, and crutches foolishly indulged in boyish sports. He suffered an acute exacerbation, which was followed by a severe grade of epiphysitis. The pain was of the most severe and atrocious character that I ever had the fortune to see in coxitis. It was referred entirely to the lower epiphysis of the knee, and was especially severe for hours at night. It resisted every form of traction, both horizontal and lateral, and in the erect position. Fixation also proved valueless for relief, and blisters, quinine, salicylic acid were ineffective.

After repeated persistent and patient trials, I yesterday cut down between and separated the sartorius and tensor vaginæ femoris, employing the anterior incision of Barker, which is the most convenient one for making an exploratory incision, since it disturbs no muscles and permits the finger easily to enter the acetabulum for diagnostic purposes.

The head of the femur was easily reached, and at first appeared to be in good condition. There was no pus in the joint, but there was an abundance of tubercular deposit around the bone. A closer examination revealed the fact that there were two points of the cartilage which were softened and elevated, underneath which was carious bone. Still closer inspection showed that the head of the bone to the epiphyseal line was loose within the capsule. The ligamentum teres had entirely disappeared, and this caput was entirely free from the remaining portion of bone.

The neck of the bone was accordingly sawn through *in situ* by an Adams's saw with long cutting blade, without disturbing any of the attachments of muscles. The fragment was then grasped with strong forceps, and lifted away, after which the loose head of the bone was easily lifted out with the fingers. The bone along the entire epiphyseal line was carious, and, as has been said, was entirely separated. In the centre of the extremity of the neck was a mass undergoing caseous degeneration, and tuberculous material was abundant. The acetabulum was but slightly diseased, although the ligamentum teres had disappeared.

The socket was curetted and thoroughly cleansed, and the upper extremity of the femur being sound, hard, and in good condition, it was allowed to remain as before. The trochanters were retained with all their muscular attachments in their normal condition.

Thorough washings, draining, and complete antisepsis were enforced.

The pain at the lower epiphysis was relieved from that hour, and at the time of writing has not returned.

The specimen shows beautifully the deceptive character of the cartilage when so serious an epiphysis is present.

My experience with these extremely painful cases and with cases of caries sicca is that unless excised early they speedily destroy the life of the patient.

SURGICAL CASES.

By MORDECAI PRICE, M.D.

[Read April 8, 1891.]

Mrs. S. (patient of Dr. Huntsman, Bristol, Pa.; weight of tumor, forty-five pounds), forty-three years old, carried the tumor for thirteen years, most of that time being a helpless invalid. She had consulted many prominent operators in the State, who advised her to let the tumor remain, as an operation would certainly prove fatal.

I was asked to see her the latter part of January, when her condition was considered desperate, and she herself thought she could not last many days. Her kidneys had refused to act for six weeks, only a few drops of urine being passed at a time, and that being distinctly albuminous; bowels refused to act, except under the tremendous stimulation of saline purgatives with the addition of compound jalap powder.

Her attendant did wonders to get his patient in condition for operation, and, when he thought he had done all that medicine could do to improve her general condition, he at once turned the patient over for operation. Not much could be expected under the circumstances, but she deserved a chance for her life, and that chance was given her. As the report will show, she made the best use of the chance.

The operation was a long and tedious one; the incision as long as we could make it before the tumor could be delivered. Adhesions universal; many of them slight, some of them as broad and thick as my hand. These were clamped with large clamping-forceps, and the tumor cut away. A number of strong ligatures had to be used. Probably two or three pounds of dark jelly-like fluid were removed from either flank. The internal viscera were well washed with warm water which had been thoroughly boiled, and the peritoneal cavity thoroughly cleansed of débris of every description. Then two to three pints of warm water were introduced and left in the peritoneal cavity. The abdomen was closed with silkworm-gut sutures, two per inch, and a drainage-tube placed at the bottom of the pelvis and plugged with gauze. The object was to let the water be taken up as much as possible by the vessels of the peritoneum.

But little ether was used and patient reacted well, passing her urine within six hours without aid. No sick stomach; no abdominal distention. On the second day a profuse diarrhœa, which lasted for four days, greatly relieving her of many annoying symptoms. Nothing was done to check the diarrhœa, thinking it would be a great benefit instead of injury, which it

proved to be. Glass drainage was removed on fourth day. The amount of drainage was considerable and added largely to the patient's comfort and recovery. She made an uninterrupted recovery.

A woman (patient of Dr. Ewing, West Grove), twenty-four years old, suffering from obstruction of the bowel, with fecal vomiting for three days before operation. The patient, a bright, intelligent girl, said she had been suffering with slight pains in the abdomen for a long time, but nothing to prevent her from going to her work.

I was asked to operate for the relief of the obstruction. At 9 P. M., the patient was etherized, and the investigation begun. There was a tumor of considerable size, extending from the left side of the pelvis, where it was most prominent, and spreading over the entire abdomen. An incision two inches long was made down to the tumor, or mass, and a plucky effort made to find out what it was. Failing in this, the incision was extended to eight inches, and the abdominal wall released with great difficulty from the tumor, from crest of ilium to crest of ilium, and from pubes to diaphragm, the adhesions being almost as strong as the skin itself.

With fingers and knife, I continued the dissection into the mass without seeing a single knuckle of intestine or any landmark to indicate their presence. After one hour of continuous effort of investigation, with considerable loss of blood, I concluded that I had done all within the bounds of safety, that it would be better to let the patient recover from the ether, and the disease destroy her, than to continue the operation under the hopeless outlook with the prospect of having her die on the table. Could there be a more unfavorable outlook for a patient than this?

The wound was carefully cleansed and sutured, and the opinion given that she could not possibly live many days. The result shows a very different state of affairs. The patient reacted well from the ether, was nourished by the bowel; on the second day had natural movement from the bowels; and now, eight weeks after the operation, is rosy, bright, and well, with a small tumor in the left groin.

Mr. F. H. W. G. (patient of Dr. Logan), thirty-two years old. The entry in my record-book of this case is, "sarcoma of bladder, bowels, and omentum; exploratory operation; absolutely no hope for him." In lead-pencil, under this, is "complete recovery." Rather a strange result from such a serious condition.

In making the diagnosis, I was not alone in the opinion that it was sarcoma, but five or six of the best men of our city, men whom we all regard as surgical teachers, had already given a similar opinion.

On arrival at the patient's home, I found him greatly depressed in spirits, emaciated to the last degree, with a tumor extending from the umbilicus into the pelvis, and from one side to the other. The appearance of the patient, and the history of the growth of the tumor, indicated to me malignancy, and I tried to persuade him against an exploratory operation, but he was determined an effort should be made for his relief. He was etherized, placed on the table, an incision two and a half inches long, partly over the tumor and partly above, was made. The hemorrhage from the wound over the

tumor was very free. I passed into the abdomen above the mass. Everything below the umbilicus was matted together in one solid mass. At this stage of the operation, and with my preconceived ideas of what it was, I concluded to close up the wound, and not make any further effort for its removal.

The wound closed nicely, except the two lower sutures over the mass; from these at the end of two weeks there was a free discharge of pus, and a short time afterward quantities of pus were discharged from the bladder, with strong indications of a fecal fistula communicating with the bladder.

The patient began at once to improve, and when I saw him some months afterward he had gained some sixty pounds, and I understand from good authority that he has been completely restored to health.

This case unquestionably was an abscess; as to just what the abscess was, or where located, is for you to decide for yourselves.

Drs. Fulton and Ewing's patient, West Grove. History previous to operation, on February 1st, miscarriage at four months, placenta removed sometime after the fœtus, patient did not do well in her convalescence, and on the tenth day went a long way to have a tooth extracted; the result was a severe attack of peritonitis complicated with pneumonia, which was probably septic. The pneumonia slowly improved; the doctor states that the peritonitis had almost entirely subsided, but from the temperature report and the family history of her condition, I should judge that the improvement was only apparent. The parotids were much enlarged, abdomen greatly distended, bowels constipated, and sick stomach, appearances of general septicæmia. Pulse 135, temperature 104°.

To some of you probably it will be interesting to know just what sort of a case we meet with in the country, and what is involved in such an operation. A telegram is received, the first train is taken to the assistance of the physician who asks your aid; your regular work is deserted, no matter how valuable.

In the particular case I shall now relate, I left the city at 2.45 P. M., went fifty miles by rail, and after a three miles' drive through the mud, arrived at my patient's house—a little shanty, three rooms—and seventeen large and small negroes in the house at the time of operation; could not drive them out. They were all fathers and mothers, brothers and sisters.

Three of the women promised to act as assistants. Notwithstanding careful directions given as to what each should do, when we got to work they would all start for the same thing, and all leave it and come back without doing it; each taking it for granted the other had done it. They could neither hold a basin nor bring a towel, nor would they stay out of the room, though ordered to do so toward the last.

I found the patient securely covered by, and in the midst of a collection of dirty rags; abdomen distended, body not washed for a week. Had not eaten nor had her bowels moved for the same period. Temperature 104½°; pulse 135. Abdomen so tender that only a very slight examination was made when it was decided that her only chance was operation, irrigation, and drainage.

A stimulating turpentine enema was ordered, but no one could give it, so I gave her about a quart, while the water was boiling for the operation. She protested so strongly against having a bed-pan under her, and as I did not think the contents of the bowel could possibly hurt that bed, I told her to let it go.

A clean bed had been prepared for her in the next room. Dr. Fulton etherized her, and she was carried to the next room to the operating table. The light was furnished at 6 o'clock from a little attic window and one small lamp, such as is found in the homes of the poor.

The abdomen was cleaned with soap and water and ether, finishing up with alcohol and water. This was all the preparation we had time to give her. An incision two inches long was made just above the pubes, and as soon as the peritoneum was reached the color of the contained fluid—pus—could easily be distinguished. When this membrane was opened a large quantity of most offensive pus was discharged. The pus sac was the entire peritoneum; the bowels were matted together and bathed in this fluid; their color was that of pickled beets, every single knuckle was adherent, but easily separated, the separation opening numerous pus sacs.

I was careful to examine in every direction for adhesions. Thorough irrigation before stitching, and after the stitches were placed again using a pitcher of water before putting in the drainage-tube.

I could find no trace of the omentum; careful dressings were applied, and the patient put to bed. Two or three injections of ether had to be given during the operation, but little ether given after the patient was on the table.

In considering an operation upon this patient, I admit that I was opposed to operating, knowing the great amount of trouble to properly care for these cases, the poverty of the patient absolutely preventing the procuring of a trained nurse, or a nurse of any kind. The physicians lived three miles from the patient, with mud almost hub deep to drive through. I, therefore, considering all the points in the case, her septic and almost hopeless condition, thought it advisable to leave the woman to her fate.

Dr. Ewing begged that she be given a chance; the patient also wished to have an operation. The description of the patient's home, given in my report of the operation, will give you some idea of the hygienic conditions to be contended against in her surroundings. Notwithstanding all the obstacles to be overcome in this case, Dr. Ewing succeeded in getting this woman well, though for two days the roads were so bad, with snow and mud, that he had to take the fields, and one day had to walk almost the whole distance to get to the house to dress the patient and clean the drainage-tube; having only a poor, ignorant colored woman to assist him in the work.

I think there can be no higher praise given to Dr. Ewing for any work of his life than in this case. Without the possibility of a fee,

with the worst roads and the worst weather, laboring for weeks to save one poor creature, and his greatest pay is the knowledge that he saved her life. Men may quibble and fight as to the existence of pus, and use salines for the removal of supposed pus tubes, concretions that have been mistaken for such, but the patients that I see suffering from collections of pus and pus tubes are not those that require a saline to make a diagnosis, nor do they require a waiting period to insure the existence of pus, nor do they offer any encouragement for dilatory or so-called conservative treatment, but at once demand the only rational and proper course—its removal.

Mrs. L. (patient of Dr. Kellar), aged seventy-seven years, suffering from strangulated hernia of thirty-six hours' duration; four inches of the ileum gangrenous; anastomosis rings were placed; bowel united four inches below the point of gangrene; the two ends of the bowel stitched in the abdominal wound; wound packed with gauze, and patient put to bed. She did not react, and died in twelve hours.

My reason for using the anastomosis rings in this case was the want of intelligent attendance and their impoverished condition, unable to employ a nurse. This is the tenth case of strangulated hernia within a year, and the second death.

The hernia was a femoral one, and a portion of omentum as large as my fist was also gangrenous, and was removed. All completely gangrenous bowel cases are of the most serious character; perhaps an artificial anus would offer more favorable chances.

I wish to show to those interested in the subject a self-threading needle for passing the threads in any operation in the bowel, as the time taken in threading a needle is of considerable importance to the patient.

DISCUSSION.

DR. JOHN B. DEAVER: I shall refer only to the case of hernia. The question brought up in regard to anastomosis is a very good one. I have had a similar experience in a femoral hernia in a patient well advanced in years, where I found the bowel entirely separated. I was able to find only one end of the bowel in the opening through the canal. Consequently I had to make an incision through the linea alba, and after some manipulation I succeeded in finding the proximate end of the bowel. I brought the two ends of the bowel through the opening, and after removing the gangrenous portion made an anastomosis, for I believed that the upper portion of the bowel was a part of the jejunum. I think that it is almost useless to establish even a temporary artificial anus where the upper portion of the jejunum is opened.

I must confess that I should like to know what was the pathology of the case of abscess. Many gentlemen take ground that many of these cases of purulent peritonitis, acute in character, are due to disease of the vermiform appendix. I have had one case of purulent peritonitis where there were fully two quarts of pus, and yet the vermiform appendix was found to be normal.

These cases of hernia are very important. In Dr. Price's case the constriction had lasted only thirty-six hours, and this is a comparatively short time, and demonstrates the steps that should be taken in the treatment of this condition. I make this a rule myself; when called to see a hernia that I am convinced is not incarcerated, I do not trust to the application of ice, poultices, and so forth, but I give ether immediately and attempt taxis; failing in this, I cut down. I think that this is the safest procedure to follow. I have had a series of thirteen cases this winter, with but two deaths. All of these cases were seen early. In one, three hours after strangulation, the bowel was dark, and it was a question whether or not the circulation would be restored. As the bowel showed some disposition to return to its natural color, it was replaced, and the patient recovered, though he had a slight attack of peritonitis.

DR. PRICE: I should like to say a few words in regard to the vomiting that occurs in incarcerated hernia. A year ago I made the statement that I had never seen a case of fecal vomiting of twenty-four hours' duration that recovered. A few months ago I assisted my friend, Dr. Shay, in an operation on an old lady, sixty-five years of age, who had had fecal vomiting for four days. It was an incarcerated femoral hernia. I think that it was two days later when she agreed to an operation, so that there was fecal vomiting for at least five days. The doctor cut down in the median line, and the hernia was so small and the swelling not tender that I did not think it was the seat of obstruction. Finding immediately that the bowel was fast in the femoral ring, he cut down over that and found the bowel for an inch and a half doubled upon itself. It was dark, but the color returned. It had probably been incarcerated there for years. Its calibre was not larger than that of a lead pencil. She made a good recovery, without any trouble. I have seen several cases, since the assertion made last year, where fecal vomiting has existed for three days. Where you have fecal vomiting from absolute obstruction, with gangrene, no patient will recover by operation twenty-four hours after this symptom has appeared.

SURGICAL SCARLATINA.

By JAMES HENDRIE LLOYD, M.D.,
PHYSICIAN TO THE NERVOUS AND INSANE DEPARTMENT OF THE PHILADELPHIA HOSPITAL, AND TO THE HOME FOR CRIPPLED CHILDREN.

[Read April 8, 1891.]

THE unfortunate result of a surgical operation in which I was interested—a result due entirely to a complication with scarlatina almost immediately after the operation—has induced me to report the case. The event is so rare, the diagnosis so much disputed, and the relation of the scarlet fever to the operation so obscure, that any observation which throws additional light upon these questions must be welcome. I think I shall be able to show, as far as one case may, that the connection of the scarlatinous rash with a surgical procedure is sometimes distinct and not a mere coincidence; that the disease is true scarlatina; that it may seriously complicate a case and even lead to a fatal issue; that its true nature may be overlooked; and, finally, that it may be followed by non-surgical cases of scarlet fever.

The patient was a boy aged seven years, under my care at the Home for Crippled Children. The operation was a trephining, done by Dr. DeForrest Willard, the consulting surgeon to the institution. As a surgical procedure it was entirely successful; and as a surgical case it will be reported elsewhere by Dr. Willard himself. It suffices to say that the operation was merely an exploratory one, and that the brain was not touched. The patient had localized athetoid movements of the right arm. The arm-centre of the left hemisphere was exposed, but further interference being found impracticable, the dura was stitched up and the wound closed. The only troublesome surgical feature of the case thereafter was a more or less constant leakage of cerebro-spinal fluid. From the very start the patient's condition was not satisfactory. The range of the temperature the first three days was from 100° to 103° F.; the pulse rose as high as 170; complaint of pain in the head was frequent, and the patient cried out at intervals and was very restless. The mental state was perfectly clear. The surgical condition was always found good, and it may be observed right here that it continued fairly good to the end, not a drop of pus or any undue inflammation being observed about the wound. In quite a large number of trephine cases which I have witnessed

and attended personally I never saw one act just as this was doing. Dr. Willard and I both felt at a loss for an explanation of an obviously bad trend in the case without an obvious cause. To re-state briefly, this bad state was marked especially by high temperature, rapid pulse, restlessness, head-pain, and a generally complaining tone. On the fourth day, the condition growing rather worse, an eruption was noted for the first time on the thighs and abdomen. This was a bright, diffuse scarlatinous eruption, very deep-colored in places, and marked by only one peculiarity, the presence of sudamina. These sudamina were at first sparsely sprinkled over the eruption, but later they appeared in very thick crops on the lower part of the abdomen and inner part of the thighs. The temperature now rose as high as 104° and even 105° F. The rash persisted for several days, gradually fading out. It covered almost the entire surface, the back especially, which was free from sudamina, showing a typical scarlatinous eruption. The face was much flushed, but around the mouth the white skin was preserved, as is so common in scarlet fever. The throat was flushed but not ulcerated. The cervical glands were little if at all involved. The tongue had the characteristic "strawberry" appearance. The patient became still more restless and difficult to manage, complaining constantly of pain in the head. The escape of cerebro-spinal fluid from the needle-wounds continued very profuse, but otherwise the wound was healing, and was thoroughly aseptic. The patient had vomited on several days before the eruption appeared. Desquamation began early (on the fourth day of eruption) at the places where the sudamina had been thickest. With the fading of the eruption and with desquamation, which became general and profuse, the child's condition improved, but only to a certain point. The urine was not albuminous.

After the eighth day of the eruption, about the twelfth after the operation, the patient sank lower and lower. Desquamation proceeded perfectly, and the urine was never albuminous, but the patient seemed to pass into a dyscrasia, with variable temperature, progressive wasting, involuntary stools, with diarrhœa, increasing mental torpor, continued head-pain, dread of light, aversion to food, and restless, disturbed sleep. He gradually failed, and died on the eighteenth day after the operation.

At the autopsy the brain showed not a trace of septic infection; there was no meningitis, and the wound was in a perfectly aseptic condition. It had not healed up at all the needle-holes, which was due to the fact that the trephine had led into a large porencephalus, from which a constant drainage of fluid through the needle-punctures had occurred.

The first and most obvious criticism of this case is that the scarlet fever was a mere coincidence. It is, of course, not possible to say that this was not so. It may be that the child would have had the scarlatina without the operation; yet I am strongly inclined to doubt this, or at least to doubt if he would have had such a severe attack, and have had it just when he did. My reasons are that the case is exactly parallel with many other cases now reported in medical literature (to which reference will be made presently) in which

a surgical operation was the immediate forerunner and apparent exciting cause of a scarlatinous rash; that the case occurred in a new and rather isolated building which had never had a case of scarlet fever in it before; that while the case was fatal it was not exactly a typical case, the throat symptoms especially being little marked, just as other surgical cases are reported as being rather atypical; that the eruption did not come out until the fourth day after the operation, although the rapid pulse and high temperature had appeared almost immediately (within six hours), being obviously the direct results of the surgical shock, and yet, as the event showed, being a part of the scarlatinous symptom-group.

That the disease was true scarlatina was shown by the characteristic scarlatinous rash. This was somewhat obscured on the abdomen and thighs by a copious eruption of sudamina, but sudamina are not unheard of in scarlatina, but are referred to especially by some of the older writers, as Rayer, Tweedie, and Ramsbotham; while elsewhere, as on the back, chest, and arms, the rash was uncomplicated and perfectly characteristic; so truly so that if it were not scarlatina we must acknowledge that an identical rash can be produced by other poisons. Again, it was shown by the throat eruption (slight, it is true), and especially by the deep-colored, clean, strawberry tongue, with its prominent papillæ. The high fever and rapid pulse receive, thus, an explanation for which we sought elsewhere in vain, while the free desquamation completes a picture which is unmistakable.

The result in our case proves, what seems to have been a rare event in other reported cases, that scarlet fever following a surgical operation may be fatal. Most reported cases have been very mild; yet it is to be noted in our case that death was not an immediate effect of the disease, but followed several days after the eruption had disappeared.

The possibility of this being a rash due to septicæmia is negatived, I think, by the fact that the wound was never in the least infected, an autopsy failing to discover any traces of infection. Iodoform was used very sparingly about the wound, and chiefly after the appearance of the rash. Small doses of antipyrine were used during the first few days, in hope of controlling the temperature. These drugs could not have been responsible.

A final convincing proof of the scarlatinous nature of the disease is the fact that within a few weeks after this boy's death three cases of simple uncomplicated scarlatina occurred in the Home, among about forty children, and pursued a favorable course.

The occurrence of scarlatina as an immediate or very early complication of surgical operations has been observed now too often to permit the relationship to be ignored, or to be dismissed as a mere coincidence. The striking array of facts presented by Dr. Goodhart[1] and by Mr. Howse,[2] observed in epidemics some years ago in the Evelina Hospital and Guy's Hospital respectively, is not to be argued away. In the Evelina Hospital twenty-five children, all of them surgical cases, presented rashes; seventeen suffering very soon after some surgical interference. In Guy's Hospital the cases happened in one ward, and necessitated isolation and special precautions to stamp it out. The relation of the disease to successive operations was most marked. Trelat,[3] in an interesting clinical lecture, founded upon two cases of his own, reviews the literature of the subject, covering nearly forty cases, and says: "Here are a group of facts which impose a certain reserve in their interpretation." He concludes that the disease is genuine scarlatina, but not altogether typical, the throat being but little affected; that it appears suddenly "a few days" after the operation, and that the only doubtful question is its exact relation to the operation. He quotes Olshausen,[4] whose conclusions are founded on 141 observations, and who believes the disease is genuine scarlatina. Hillier thinks that surgical operations render persons receptive of the disease, and refers to the surprising fact that in a hospital for sick children a large proportion of the patients who contracted scarlatina had had a surgical operation within one week.

Cases are on record, on the other hand, which seem to prove that a scarlatiniform rash, not specific scarlatina, may show itself after surgical injury or operation. Thus surgeon Frolliott[5] records the case of a soldier in India who was injured by an explosion of powder. A well-marked rash, resembling scarlatina, came out on him in a few days. He had not been exposed to scarlet fever, which is said to be a very rare disease in India. He had a rise in temperature, and the rash was followed by desquamation. Some pronounced the disease scarlatina, while others thought it was due to the absorption of some septic material. Sir James Paget,[6] who has some interesting observations on scarlatina after operations, seems inclined to favor the view

[1] Guy's Hosp. Rep., 3d Series, vol. xxiv.
[2] Ibid.
[3] Le Progrès Médical, Sept. 14, 1878, p. 721.
[4] Arch of Gyn., Bd. ix., Heft 2.
[5] Brit. Med. Journ., 1879.
[6] Clinical Lectures, edited by Marsh.

that a surgical operation confers a peculiar liability upon a patient to the reception of an epidemic or contagious poison.[1]

I have not dwelt upon the subject of scarlatina in childbed, which is evidently closely allied to the subject in hand. The opinions of obstetricians seem to vary, many holding that the puerperal rash is of septic origin. That there is, however, such a disease as scarlatina coming on very abruptly a very few days after labor does not seem to admit of doubt after reading the experience of some of the older obstetricians—as Ramsbotham, for instance.

It seems to me that the only view admissible with our existing knowledge is that genuine scarlatina finds occasionally in surgical cases a favorable field for rapid development; that this development is not always typical; that some rashes, closely resembling, if not identical in appearance with scarlatina, may *possibly* be produced by septicæmia (or even by drugs?); but that, finally, a typical scarlatinous rash, with high fever, rapid pulse, and "strawberry" tongue, even with very slight throat symptoms, justifies the diagnosis of scarlatina and demands isolation and disinfection.

DISCUSSION.

DR. JOHN B. DEAVER: I have not the slightest doubt in regard to the diagnosis of this case. At first I rather looked upon it as a mere coincidence. I have never seen typical scarlet fever follow an operation, although I have seen a rash resembling scarlet fever. I have never seen desquamation or the presence of albumin in the urine. I recently had an interesting case of excision of the knee-joint, which I closed without drainage and put up in plaster-of-Paris. The next day the temperature ran up. The third day a typical rash occurred upon the child's body, which looked very much like that of scarlet fever. In the course of four or five days this disappeared and the temperature came down to normal, but I felt that I had better examine the condition of the knee. I found it perfectly normal and aseptic. I believe that in Dr. Lloyd's case the scarlet fever microbe must have existed prior to the operation. The condition of the child immediately after the operation would undoubtedly prove a predisposing factor in the production of the disease. The rash in this case resembled somewhat the rash from iodoform poisoning. I have seen two cases of iodoform poisoning, but in both there were pronounced mental symptoms.

DR. H. W. STELWAGON: The scarlatinal rashes following injuries and operations have really been the subject of discussion and investigation for some years, and while the subject is not a broad one, at the same time it is

[1] For a careful discussion of this subject, see Dr. J. Lewis Smith's article on "Scarlet Fever," in the American System of Medicine, vol i.

exceedingly interesting and is still involved in more or less obscurity. As regards the case reported by Dr. Lloyd, the fact that he had a series of scarlet fever cases following sometime subsequently, must certainly be considered as bearing strongly in favor of true scarlatina in the particular case reported. That persons suffering from injury or operations are particularly liable to scarlet fever poison, I think, admits of no question. There is, probably, a two-fold reason for this: first, that owing to the fact that we have an injured and open surface, the poison has an easier means of ingress and possibly enters in larger quantity; and secondly, the impaired resisting power induced by the injury itself. At the same time, I cannot believe that all of the scarlatinous rashes reported from time to time represent, by any means, true scarlet fever. There are other rashes which simulate the scarlet rash. In the first place, we have what may be called a neurotic eruption, a neurotic erythema. A familiar example of a purely neurotic erythema is seen in blushing. This is evanescent, but it is not improbable that the same cause could act for a longer time and cause a more or less general and continuous erythema. With this, in certain patients of a neurotic or hysterical organization, we may have high temperature. There is no reason why these two conditions could not, in some instances, be associated in the same patient at such times, and thus present a puzzling resemblance to scarlet fever.

Another cause of these rashes is the so-called drug irritation to which Dr. Deaver has briefly referred. A scarlatinous rash, which it is at times impossible to distinguish from that of true scarlet fever, may follow the ingestion of such drugs as quinine, atropia, sodium salicylate, morphia, and similar medicines. Not only may we have the rash, but we may also have a febrile action, especially if the drug is continued. We may also have, especially after the use of quinine, desquamation; not only may this occur as a bran-like desquamation, but also in large flakes. Another drug the external use of which is apt to bring about a scarlatinous rash is iodoform. The peculiarity of this iodoform rash is that it almost invariably has its starting-point at the point of direct application; in this eruption we may have constitutional symptoms as well as desquamation. Another cause referred to is sepsis. This is, without doubt, an extremely common cause of the rashes occurring at the time of injury or operation. Such a rash may at times, as experience and observation have shown, resemble true scarlet fever rash.

The diagnosis in these scarlatinoid rashes is, therefore, by no means easily reached in all cases. The given case must be studied in its individuality, both as regards the characters of cutaneous and general or other symptoms. All possible causes must be carefully considered, and one after another eliminated. The medicinal rashes disappear rapidly, as a rule, on removal or discontinuance of the drug. These rashes and the neurotic cases are not commonly accompanied by constitutional symptons. Where the diagnosis settles down to a question between scarlet fever and septicæmia, we must carefully study and weigh each symptom; in some instances a few days' observation is absolutely necessary before the true significance of the eruption becomes evident. Desquamation is not of so much importance from a diagnostic standpoint, inasmuch as it is a late feature of the case, and may, moreover, follow exceptionally any of the several scarlatinal rashes already referred to.

DR. E. T. DAVIS: As far as the classification of scarlatinoid rashes complicating obstetrical cases is concerned, I think they may be divided into two classes. One is attended by mild symptoms running a favorable course and terminating without serious complications, often septic. These cases occur in women attended by careful attendents and where no scarlatinal poison comes in contact with an open surface in the genital track. These cases are peculiar from the short period of infection, three to five days. The rash comes out quickly and angina is rarely present. The second form is where the scarlatinal virus is implanted upon an open surface in the genital track. Clinically these cases are indistinguishable from puerperal sepsis, and they present a high mortality. There is no difference between the micrococci of puerperal sepsis and those taken from non-puerperal scarlatinal cases.

There are interesting examples showing the direct contagion of the disease. Thus, in one, a midwife, who had a child at home suffering from scarlet fever, infected four patients, all of whom died. Out of forty lying-in women, twenty contracted true scarlet fever from outside sources. Of these cases all recovered. I have recently attended in private practice a confinement where there was scarlatina in the house, but under careful precautions the mother escaped the infection.

DR. JOSEPH HOFFMAN: I recently attended a woman who was confined somewhat prematurely, and I found that she occupied the bed which had just been vacated by one of her children who had had scarlet fever. Three or four days later she developed the scarlet fever eruption. The infant escaped infection altogether. The patient recovered without a particle of abdominal trouble, the whole course of the disease being strictly typical. That puerperal women do have scarlet fever eruption no one will question. The more we study the question, the more will we come to the conclusion that in the great majority of these cases the eruption is due to septic causes.

DR. WILLIAM M. WELCH: It is unfortunate that the term surgical scarlatina is used, since it seems to imply the existence of a special form of scarlatina, which is not a fact. I think, however, the idea was formerly held that there was such a disease as surgical scarlatina, distinct and separate from ordinary scarlet fever, and that it developed independently of the ordinary means of infection. According to the experience of many physicians, particularly those who practise obstetrics, the lying-in woman is peculiarly susceptible to the contagion of scarlet fever. I do not mean to say that susceptibility once destroyed is renewed by the parturient state, but that the parturient condition renders a woman rather more susceptible to scarlatina than she would otherwise be. The same view is held in regard to surgical cases. I am, however, not quite sure that this view, in either case, is borne out by facts. There is no doubt that the parturient condition and the traumatic state, both favor the action of zymotic poisons; that is to say, when such poisons enter the system they tend to produce sepsis, which is often attended by a scarlatinoid rash, and that this is sometimes mistaken for scarlet fever. If I mistake not, in Guy's Hospital Reports for 1878 or 1879 will be found the series of cases of so-called surgical scarlatina referred to in the paper. The disease prevailed in the hospital to such an extent that it was found necessary to postpone, for a time, all surgical operations. On very close observation it was found that the disease was true scarlet fever, and that the contagion was introduced into the ward by a child, who was admitted

while suffering from some of the sequelæ of that disease. The contagium of scarlet fever is very subtle, and it is, therefore, possible for it to reach the parturient or traumatic patient, just as it does many other individuals, without our being able to account for its source. The chief question to be decided in all such cases is, whether the nature of the complication is scarlatina, or whether it is sepsis accompanied by a scarlatinoid rash.

DR. DEFOREST WILLARD: Having performed the trephining in this case for Dr. Lloyd, I watched its course with the utmost interest, and I must confess that the eruptions for the first few days after the operation were most puzzling. I am glad to say that I have had but little experience with scarlet fever in surgical practice; in fact, this was the first case that I had seen. It is an error to use the term "surgical scarlatina," as it might lead to the inference that this form of scarlatina was of surgical origin. It seems to me that all of the cases reported show that the disease was simply scarlet fever complicating surgical operations. It is easy to understand how an operation which is always accompanied by a certain amount of shock would be very likely to favor the development of this disease, by impairing the resisting power of the individual. In regard to this particular case, I do not think that there is any difficulty in tracing the origin of the disease, since the child was frequently visited by its mother and friends. Beside this it was examined a week previous to the operation and again two or three days previous, as well as on the day of operation, by a number of physicians, some one of whom may have brought these germs with him. The patient did not die as a septic case, but gradually sank away as happens in profound poisoning of the blood from scarlet fever or diphtheria. I was careful through all the steps of this trephining to keep the wound as aseptic as possible, and its course, as well as the subsequent post-mortem, showed that there was not the slightest infection of the wound, or of the intra-cranial contents.

Macewen has a case of scarlet fever following osteotomy, the sore-throat appearing on the day of the operation and the rash on the following day. The course was typical and desquamation followed. The wound showed no redness nor flush, and the clot filling the wound vitalized as usual. Several other osteotomies in the ward at the same time had sore throats, some of them ulcerated, but there were no other symptoms.

DR. LLOYD: I claim only that this case shows, as many others have shown, that there is some relationship between surgical operations, trauma, and the puerperium, and the scarlatinal poisoning. Otherwise, how can we explain the distinctive nature of this affection, as it comes on two or three days after labor or after operation. I believe, of course, that the scarlet fever is due to a specific poison—although what that is no one yet knows—and that the surgical operation acts only as an exciting, not an essential, cause. I use the term surgical scarlatina only in deference to an old custom. An interesting point is that covered by Dr. Stelwagon, as to the distinction between these eruptions, whether they are all instances of true scarlet fever or whether some are produced by drugs and some by sepsis. I have no doubt that we have all three causes. But where we have so many typical symptoms as in my case, followed afterward by the appearance of cases in the same house of non-surgical scarlet fever, the inference seems very plain that it was true scarlatina. The duty of the physician to regard the case as true scarlet fever, and to practise isolation and disinfection, seems clear.

ABDOMINAL SURGERY AT THE KENSINGTON HOSPITAL FOR WOMEN.

By CHARLES P. NOBLE, M.D.,
SURGEON IN CHARGE.

[Read April 8, 1891.]

THE following report embraces all cases of abdominal section done in the Kensington Hospital for Women during my connection with it. Cases of hernia, forming a special class, are excluded. The number of operations is eighty-five, being the work of three operators—Drs. Kelly, Robb, and myself. As it is manifestly impossible to report these cases in detail, they will be given in groups, with comments on the nature of each class. And, to add to the practical value of the report, I will give the lessons I have learned and the impression I have formed from the study of these cases.

SELECTION OF CASES FOR OPERATION.—Certain definite principles have been followed in the selection of cases for operation. Operation has been recommended in all cases of ovarian and par-ovarian tumors, ovarian abscess, pyosalpinx, hæmato-salpinx, and of hydro-salpinx unless organic disease of the vital organs clearly forbade it; also in cases of fibroid tumor of the uterus in which hemorrhage or pressure symptoms demanded it; also in cases of extra-uterine pregnancy, both before and after rupture; also in certain cases of simple salpingitis and ovaritis in which well-directed treatment, long continued, failed of relief, and in which life was made burdensome by the continuance of the disease. Operation has been refused only in cases of serious kidney disease or of advanced cancer.

TREATMENT OF PATIENT BEFORE OPERATION.—Whenever practicable, for a week prior to operation patients have been put upon simple food, the bowels gently purged, and the skin made clean and active by warm baths given daily or on alternate days. This regimen is considered especially important for cachectic women with sluggish

emunctories. When time is precious a purge is given, and a thorough bath. As my experience grows, I become more convinced of the advantage of preparatory treatment entending over weeks or months in chronic broken-down cases. The nutrition of such cases should be improved in every way; and the state of their emunctories be carefully studied.

In acute cases, if operation is to be done, all delay is pernicious. Before operation the abdomen is scrubbed with soap and water, alcohol, and sublimate solution 1 : 1000.

PREPARATION FOR OPERATION.—I believe that the essentials for success in abdominal operations are asepsis, rapid, careful, and thorough operating, thorough irrigation in septic cases, and drainage.

To secure asepsis an elaborate technique is faithfully followed. The doctrine that infection comes by contact is fully believed; hence everything coming in contact with the patient is rendered aseptic.

TREATMENT OF THE HANDS AND ARMS.—The hands and arms of the surgeon and assistants are washed carefully through three waters, a good lather being made with soap, and the nail-brush vigorously applied; especial attention is given to the subungual spaces. Ten minutes are consumed in the process. The hands are them immersed in a saturated solution of permanganate of potassium, next in a saturated solution of oxalic acid to remove the permanganate, and, finally, in a 1 : 1000 solution of corrosive sublimate, in which they remain three minutes. Whenever the skin about the fingers is chapped, or the hands have been recently exposed to septic material, the fingers are soaked in peroxide of hydrogen solution before the sublimate bath is used.

DRESSINGS.—*Gauze* is prepared by tearing cheese-cloth in squares of one yard, which are boiled in a solution of carbonate of sodium two drachms to water one gallon, for twenty minutes; then washed through pure boiled water four times; wrung out and soaked in sublimate solution 1 : 500 for one hour; then preserved in alcohol. Before use it is washed in sterilized water.

Silk is prepared by winding Chinese silk on spools; boiling it for twenty minutes; soaking it for three hours in sublimate solution 1 : 1000; and preserving it in 4 per cent. carbolized alcohol. Before each operation it is boiled fifteen minutes. In the future I propose to sterilize it in the steam sterilizer.

Catgut is prepared by heating it in the hot-air sterilizer for four hours, gradually increasing the heat to 280° F. The last half-hour

the heat varies from 250° F. to 280° F. It is then preserved in carbolized alcohol 4 per cent.

Sponges are prepared by—beating to get rid of dust; soaking in hydrochloric acid one drachm to water one pint for from twelve to twenty-four hours; washing through twelve to sixteen waters, until the water ceases to look yellow; soaking in sublimate solution 1:1000 for twelve hours; when they are transferred to carbolic acid solution, 4 per cent., for preservation. Varying qualities of sponges are used, from the reef sponge to the potter's sponge, the cost varying from one to fifty cents each. The coarse sponges are bleached by "White's method" before they are washed. Before using them, sponges are washed in boiled water, and are used but once. By exercising some care the average cost for sponges for each operation will not exceed fifteen cents. In comparison with the assurance of always having aseptic sponges this is nothing.

Instruments are *kept* aseptic. Before each operation they are sterilized in an Arnold's steam sterilizer for an hour. Formerly a Rohrbeck's dry hot-air oven was used, temperature 250° F. to 300° F., for two hours. This heat spoils the temper of steel instruments. After a clean operation the instruments are thoroughly washed and scalded, special attention being paid to the French joints and irregularities. After a septic operation the instruments are sterilized, after washing, for one hour, then dried and put away.

Basins and *trays* before operation are thoroughly washed with soap and water, scalded, and washed with sublimate solution. They are then filled with boiling water. After operation the same process is repeated, and after septic operations they soak over night in sublimate solution.

Towels used about the patient have been preserved in 4 per cent. carbolic acid solution, or have been freshly sterilized with steam.

THE NURSE.—The nurse for the operation is kept away from septic cases, should such be in the hospital. She has a bath and a fresh suit before entering the room.

THE OPERATING-ROOM.—Formerly, when the hospital had no operating-room, the room selected was scrubbed and aired for twenty-four hours. Then the woodwork was wiped with sublimate solution 1:1000. All tables were likewise wiped with sublimate solution. Now, with a model operating-room, having tiled floor and walls, abundant light and special ventilation, the walls are wiped, and the floor scrubbed and flushed with water, which runs into an *open* roof-spout; thus obviating a sewer connection. After foul operations

sublimate solution will be used. Every facility for obtaining and maintaining cleanliness and asepsis is afforded by the apparatus in the room. Wash-basins with an abundance of running water for washing the hands, and instruments and basins, are very convenient. The room, when in use, is protected against sewer-gas by the best modern plumbing used throughout the building; while the waste-pipe leading from the operating-room is doubly ventilated. Further protection is afforded by the modern traps. Between operating days the waste-pipe from the operating-room is shut off from the sewer by an air-tight valve. Thus a maximum protection is afforded against septic hands, instruments and appliances, with a minimum danger of atmospheric pollution. Clean water is obtained by the use of the Pasteur filter; and this is sterilized in a jacketed kettle heated by steam from the boiler. In this way an abundance of sterilized water is assured.

The room is warmed with steam by the system of indirect radiation, and is ventilated by a warm ventilating flue. The temperature is kept at 75° F.

OPERATION. *Anæsthetic.*—Ether was used formerly for all cases. Various bad results have made me believe that chloroform is a better anæsthetic for the abdominal surgeon. At the present time I do not use ether in old women, nor when bronchitis, nephritis, or organic heart disease exists. I have found cachectic subjects, "wrecks," and fat women to take ether badly. The anæsthetic is given late, so that the operator waits for the patient rather than the patient for the operator. I believe anæsthesia in itself to be dangerous, and that the danger increases with the duration of the anæsthesia. The Allis inhaler is used for ether; the Esmarch inhaler for chloroform. From ether I have had "collapse" once; pneumonia once; bronchitis twice; uræmia and death twice. From chloroform, "collapse" once; uræmia and death once.

Technique of Operation.—The technique employed is not peculiar. I believe in rapid, careful, and thorough work. This is shown by the fact that only two exploratory operations are found in the list.

No chemical antiseptics are used during operation. The instruments and sponges are kept in sterilized water.

Toilet of Peritoneum.—In non-septic cases, such as simple ovarian tumors, the peritoneum is simply sponged dry before closing the wound. In these cases the aseptic technique employed completely fills every scientific requirement. No sepsis is in the peritoneum before operation; none is introduced during operation; hence none is present after operation.

In septic operations, including pus accumulations, hæmato- and hydro-salpinx, more or less irrigation is used. If the presence of sepsis be doubtful, as, for instance, from the escape of some fluid from a hydro-salpinx, water is poured into the pelvis, and it is sponged dry. If septic matter has escaped into the pelvis in small amount, the pelvis is irrigated with sterilized water by means of the Davidson syringe—care being taken to protect the general peritoneal cavity. When large amounts of septic material are to be removed, I use the "flusher" and irrigate the entire peritoneum with gallons of water. This process requires time, and entails shock. I do not like it altogether, yet know of no substitute. In septic cases the scientific requirements are not met by an aseptic technique. The flusher may disseminate the septic matter throughout the peritoneal cavity. Moreover, when plain sterilized water is used, septic foci in the belly are not disinfected. Yet, practically, the results obtained in such cases by asepsis with free irrigation and drainage are much better than by the use of chemical solutions to disinfect the peritoneal cavity. Hence, until some disinfectant is discovered which will kill germs without irritating the peritoneum, the present plan must be adhered to. I only use sublimate solution in the belly to disinfect a limited area, such as a pedicle. It should be used on a sponge sparingly. The peroxide of hydrogen may prove useful for this purpose.

Ligatures and Sutures.—In abdominal surgery aseptic silk is the best material for ligatures and sutures.

Drainage.—Drainage is necessary for safety in all cases having dense adhesions; and I believe it is always of advantage. I use it in almost every case. When the drainage-tube is properly cared for, I believe that there is no objection which can be urged against it. The plea that it favors hernia is apparently an objection; but it only favors hernia when left in a long time, and it is only left in a long time in cases in which there is excessive drainage; cases which would frequently die without it. Such women should be glad to have a hernia—it is hernia or death. Of the 85 cases reported, 77 were drained, and 8 were not drained.

Dressing.—After the incision is sutured the abdominal wall is washed with sublimate solution, and a wet sublimate gauze dressing is applied. A layer of cotton is applied over this; and the whole is held in position by a Scultetus bandage. The drainage-tube is buried in the cotton, and the bandage is applied over all. Rubber-dam is used about the tube only in cases in which an excessive flow is expected.

During the operation the patient's legs are wrapped in a blanket, and her underclothing is protected by covering with towels. The use of the Kelly pad to drain away all fluid is, also, of the greatest assistance in keeping the clothing dry. After operation the patient is put in a bed which has been warmed with hot-water cans. The cans remain; care being taken to avoid burning the patient.

SHOCK AND COLLAPSE.—One patient has "collapsed" from ether, and one from chloroform. There was distinct paralysis of respiration in each case. The collapse from chloroform was the more profound. The lower end of the table was elevated immediately; the chin drawn forward; artificial respiration by Sylvester's method kept up; and hypodermics of strychnia solution and tincture of digitalis given. In the chloroform case, in addition, ether and brandy were given hypodermically, and the faradic current was used over the phrenic nerve. These methods were used in the order in which I estimate their value. I may say that drawing the chin forward is not Howard's method. It has been used in Baltimore for many years, and was in constant use from 1882 to 1884. For shock on the operating-table strychnia and digitalis have been used; at times whiskey. Careful anæsthesia and quick operation are the best preventives.

AFTER-TREATMENT.—In the majority of cases this is simple. Nothing is given for twenty-four hours. One drachm of water every half-hour is given the second day. Two to four times this amount is given the third day, with milk and lime-water of each one drachm, or two drachms of beef-tea, every half-hour. These amounts are rapidly increased, and the frequency of administration decreased. On the sixth day liquid diet practically *ad libitum* is given, and about the eighth day soft diet. The bowels are moved early, especially if there is much pain or any fever. Most pain after section comes from flatus. The bowels are moved, preferably by enema, or by calomel in broken doses, or by citrate of magnesia solution. As an enema the following is employed:

℞.—Magnesii sulph. . . . . ℥ij.
Glycerini . . . . . ℥i.
Ol. terebinth. . . . . ℥ss.
Aquæ . . . . . q. s. ad ℥iv.—M.

This is a very satisfactory formula.

The tube is attended to by myself. It is drained two or three times in twenty-four hours; oftener if the drainage is excessive, or if

bleeding is going on. Sterilized cotton is seized by the tube-forceps and passed down the tube. In this way all fluid is removed. Then a rope of gauze is passed down the tube, and the cotton and bandage reapplied. Each time before cleaning the tube the hands are scrubbed, and if septic cases are being handled, a sublimate bath is used.

The tube is removed early; usually on the second day. It is removed as soon as the drainage is straw-colored and does not run up the gauze into the cotton. After removing it the provisional stitch, which has been placed during the operation, is tied. The wound is now dusted with a powder containing one part of iodoform to seven of boric acid. Fresh gauze and clean cotton are now applied, and, in general, the wound is not looked at again until the seventh or eighth day, when the deep sutures are taken out and adhesive straps put on. This method of dressing I find perfectly satisfactory. I have had but one stitch-hole abcess in over a year.

The *catheter* is not used if it is possible to avoid it. When necessary, a glass catheter is employed. This is taken from sublimate solution; the vestibule is dried with cotton; the, catheter properly smeared with vaseline, is inserted; after use it is thoroughly cleaned and put back in sublimate solution. Catheter cystitis is rare.

Patients are kept on their backs for two weeks. The bed-rest is used after ten days. After two or three weeks they are allowed to get up, and are discharged, in general, after four weeks. I think it is best to keep section cases in bed three weeks. Fat women should lie fully three weeks; they are most liable to have hernia.

Treatment of Complicated Cases.—Shock is met by the use of strychnia and digitalis given hypodermically; external heat and hot coffee, or hot beef-tea and whiskey given by enema. I do not like to give more than thirty minims of tincture of digitalis, nor one-eighth of a grain of sulphate of strychnia, within six hours If shock gives way to asthenia, strychnia and digitalis are continued. In twenty-four hours one drachm of tincture of digitalis, and from $\frac{1}{4}$ to $\frac{1}{2}$ of a grain of strychnia, are given. For stimulation, enemas of beef-tea one pint, whiskey two ounces, are used. For rectal alimentation, the following combination is used:

One egg.	
Milk	℥viii.
Peptonize, and add whiskey	℥j–℥ij.

This is given every six hours.

I have not found rectal injections to relieve thirst.

When fever occurs, every effort is made to move the bowels.

An enema, calomel, or magnesia citrate solution is used. I have found the stomachs of those needing purgation too irritable to retain Epsom salts or Seidlitz powders.

Morphia or opium is used scarcely at all. Cases that do well do not need it. A little encouragement enables them to bear the pain for twenty-four hours, after which time it usually is not severe. In very excitable women, and in cases where pain has kept up for several days, morphia has been given sparingly. Whether this plan is the best in patients that are suffering severely I am not entirely convinced, nor that it is best to withhold morphia in all cases, but have yielded to the current of modern practice. I intend to try phenacetin, antipyrine, chloral, and the bromides for sleeplessness, in cases in which the condition of the pulse does not contra-indicate depressants.

Patients requiring stimulation usually have an irritable stomach; hence whiskey is given by enema, or champagne by the mouth.

Less can be done by alimentation and medication after abdominal section than after other operations, to combat asthenia; because the stomach is not available, as a rule. The fate of the patient is decided, in general, when the operation is completed.

ANALYSIS OF CASES.—Of the 85 cases operated on, there were of

Pyosalpinx { single 5 / double 6 }	11
Chronic salpingitis and ovaritis (Of these, 10 were densely adherent.)	18
Cirrhotic ovaries	5
Tubercular peritonitis: cancer of ovaries (same patient operated on five times)	5
Parovarian cysts	2
Ovarian cysts	14
Tubal pregnancy { unruptured 2 / ruptured 2 }	4
Retroflexion—hysterorrhaphy	4
Hydro-salpinx	4
Fibroid of uterus (1 myomectomy, with removal of one appendage; 3 removals of uterine appendages; 1 removal of one appendage)	5
Cæsarean section	1
Bowel adhesions	1
Mixed cases. Ovarian tumors complicated by { salpingitis 4 / pyosalpinx 4 / hydro-salpinx 1 / hæmato-salpinx 2 }	11
Total	85

Of these abdominal sections, 18 were done by Dr. Kelly, 7 by Dr. Robb, and 60 by myself. There have been 7 deaths, in my own cases.

Both uterine appendages were removed in 60 cases for ovarian tumors, or the various forms of salpingitis or tubal pregnancy.

One uterine appendage was removed in 13 cases—or really in 12 cases, for in one the other tube and ovary was removed subsequently. This poor woman figures as 5 cases of tubercular peritonitis and cancer of the ovaries. She will be mentioned later. Of the women who had but one appendage removed one has had a baby, and a second is pregnant. The first was operated on *in extremis* for a huge pyosalpinx and abscess of the ovary; the other had a myomectomy and removal of one lightly adherent appendage.

In 4 cases hysterorrhaphy was done.

In 1 case the operation was to separate bowel adhesions resulting from a previous section.

There was 1 case of Cæsarean section; a thoroughly unique case, which will be reported in full to the College of Physicians.

There were two exploratory incisions. The first was made to determine the nature of an exudate forming after the removal of the appendages for fibroid of the uterus. It proved to be a cellulitis of the broad ligament, caused by an infected pedicle. This case and two similar cases suggest to me that many of the so-called hæmatomas reported by Mr. Tait are cases of infected pedicle. The other exploratory incision was an incomplete operation, in the sense that I started to remove a fibroid tumor, but, finding an anomaly of the bladder, I desisted. The bladder was developed to within one inch of the umbilicus, and there was an absence of the vesico-abdominal pouch of the peritoneum; that is, the peritoneum simply covered the posterior wall of the bladder. As the bladder was three inches wide at its upper limit, it would have been necessary to make a lateral incision along the outer border of the rectus muscle. To do a hysterectomy under such circumstances I felt to be unwise.

Two operations were incomplete. The operation was made for the removal of both appendages. In the first case there was a chronic salpingitis on the right side, and a pyosalpinx and intra-peritoneal abscess on the left side. The right appendage and the left tube (pyosalpinx) were removed. The left ovary was imbedded in exudate, and could not be felt. This patient is now the picture of blooming health, has gained thirty-five pounds, and menstruates regularly without pain.

The other case was one of defective development of the sexual organs; having, in addition, hydro- and hæmato-salpinx. On operation the left ovary was not removed, because it was apparently imbedded in the broad ligament near the pelvic wall. To have removed it would have required violence to tear it from its bed. As the operation had been prolonged, I did not think it wise to take the time necessary to control free bleeding from a ruptured ovarian artery. The woman has not menstruated—which fact shows the functional condition of the ovary.

One broad-ligament cyst was removed from a woman who some years before had had the appendages removed for pyosalpinx. The exciting cause of the cyst was an infected pedicle.

Two cases were simple sections for the evacuation of fluid in a case of tubercular peritonitis with cancer of the ovaries.

The case last referred to deserves special notice. She had had both breasts removed and axillas cleared out some years ago for cancer. Five operations were performed for the primary and secondary growths. While my patient, there were a number of nodules about the thorax, which were quiescent. She had six abdominal sections; one before the time covered by this report. Four times the fluid was removed, and twice in addition one uterine appendage was removed. After each operation she filled less rapidly than before. The peritoneum was everywhere studded with miliary bodies, supposed to be tubercles. The appendages were supposed to be tubercular, but microscopic examination demonstrated carcinoma. She died eleven days after the last section. The autopsy showed cancer of the stomach, duodenum, and liver. It was noticed at the last section that the tubercular peritonitis was undergoing a cure. The tubercles had disappeared, leaving the peritoneum thick and opaque. At the autopsy it was noted that the tubercles had disappeared in the pelvis and lower abdomen, but that in the upper abdomen they were still abundant.

This fact suggests the query as to whether there is a relation between tubercle and cancer in the abdomen; and, again, were the miliary bodies really tubercular? Vomiting had been constant for nearly two months before the last operation. No pain was complained of, and the vomit was not bloody. It was attributed to the presence of the accumulating fluid. After operation the vomiting continued, everything being rejected. Death occurred from exhaustion on the eleventh day. This death is not included in the seven as a death from abdominal section, as the operation had nothing to do with it.

Deaths.—Three deaths occurred from suppression of urine. In one case albumin was found in the urine, and chloroform was given. Death after two days. This woman was a "wreck." She had adherent appendages and an intra-ligamentous ovarian tumor adherent to the right ureter. The ureter was dissected away from the tumor and dropped. Operation was difficult. Autopsy showed right surgical kidney and left contracted kidney; no peritonitis.

In the second case no albumin was found in the urine. Ether was given. Operation: Difficult enucleation of appendages imbedded in exudate. Death resulted on the fifth day from uræmia. Autopsy showed contracted kidneys; no peritonitis. This woman figured in the newspapers as having escaped from the hospital in her gown while delirious. In jumping from a low second-story window she fractured her olecranon, but otherwise I was unable to find any injury. She had been sick many years. The third case was a "wreck," having been an invalid several years. No albumin was found in the urine. Ether was given. An ovarian and a parovarian tumor were removed; rapid, simple operation. Death after three days from uræmia. Autopsy showed contracted kidneys; no peritonitis.

These cases taught me the necessity of having the urine examined microscopically—even repeatedly in the cases having arterio-capillary fibrosis. With the knowledge of the kidney disease I would not operate now on such cases as the first and second. Women with contracted kidneys will not stand difficult operations. In such a case as the third I would try in every way to improve nutrition and to assist the kidneys, and then operate under chloroform.

One death occurred on the third day from intestinal obstruction. At the autopsy it was found that an organic stricture of the colon existed, which had resulted from a long-standing adhesion of the colon to the broad ligament.

Two deaths occurred from peritonitis—one on the fifth day from septic peritonitis, after the removal of double hydro-salpinx. The drainage-tube was used, but it did not empty the pelvis. This death is the only one after operation in my experience in which death would not have occurred without operation.

The other occurred on the second day after the removal of double pyosalpinx and a right ovarian tumor. Free irrigation and drainage. Peritonitis developed the first day. The abdomen was again opened and flushed. Death within forty-eight hours. These are the only deaths which have occurred in my practice, except after the gravest

operations, or when the patients have been extremely prostrated by acute or chronic disease. Both of these women were feeble.

One death occurred thirty-six hours after operation for ruptured tubal pregnancy. The abdomen was full of blood. Fever shortly developed, and the patient died within thirty-six hours in hyperpyrexia. This death was attributed to sepsis, but I do not feel clear as to its cause. It was more probably due to acute anæmia.

RESULTS.—After all, the important question is, What good was accomplished by these operations? It is gratifying to be able to say that the results have been good. I do not know a single patient who is not distinctly better than before operation. Because of the fact that all these patients are not under under my care at present it is not possible to give the exact percentage of those cured, improved, etc. Many become immediately and permanently cured after convalescence from the operation. More are improved after operation, and their cure is delayed six or more months. Some will never be well women, although the operation accomplished all that was expected. The menopause with its nervous manifestations annoys some patients, but in none have serious symptoms been found.

Finally, those patients became well quickly who were operated on early, before the general health and nutrition were impaired. The operation removed all disease. Depending upon the chronicity of the disease and the local complications, and upon the impairment of the general health, the restoration to health has been rapid or slow. The "wrecks" have improved, but none of them are robust women. The question of prompt, early operation for grave pelvic disease is now the most important one in gynecology, and results can only improve when the profession becomes convinced of this fact, and women are sent to the gynecologist while it is yet possible to cure them.[1]

[1] The technique employed is based on that introduced by Dr. Kelly. I am under many obligations to him, and to Drs. Robb and Boyd, for advice and assistance.

No.	Name, and date of operation.	Age	Disease.	Operation.	Drainage	Result.	Operator.
1	Mrs. McG., June 8, 1889	30	Pyosalpinx.	Abdominal section; removal of uterine appendages.	1½ days	Recovered.	Dr. H. A Kelly.
2	Mrs. H., June 24	27	Double pyosalpinx.	Removal of uterine appendages.	36 hours	Recovered.	Dr. H. Robb.
3	Mrs. S., July 5	18	Large cirrhotic ovaries.	Removal of uterine appendages.	10 hours	Recovered.	Dr H. Robb.
4	Miss E., July 24	23	Double pyosalpinx.	Removal of uterine appendages.	2½ days	Recovered.	Dr. H Robb.
5	Mrs. N., July 29	23	Salpingitis and ovaritis.	Removal of uterine appendages.	None	Recovered.	Dr. H. Robb.
6	Mrs. C., July 31	40	Tuberculous peritonitis.	Abdominal section.	12 hours	Recovered.	Dr. H. Robb.
7	Mrs. K., Aug. 5	30	Salpingitis and ovaritis.	Removal of uterine appendages.	12 hours	Recovered.	Dr. H. Robb.
8	Mrs. J., Aug. 14	31	Cirrhotic ovaries.	Removal of uterine appendages.	None	Recovered.	Dr. H. Robb.
9	Mrs. X., Aug. 19	36	Left, pyosalpinx; right, salpingitis.	Removal of uterine appendages.	48 hours	Recovered. (Stitch-hole abscess.)	Dr. C. P. Noble.
10	Mrs. J., Aug. 22	20	Double salpingitis; cheesy tubes; dense adhesions.	Removal of uterine appendages.	24 hours	Recovered. (Sinus.)	Dr. C. P. Noble.
11	Mrs. P., Sept. 10	30	Pyosalpinx, double.	Removal of uterine appendages.	Yes	Recovered.	Dr. H. A. Kelly.
12	Mrs. W., Sept. 12	31	Parovarian.	Removal of one appendage.	None	Recovered.	Dr. H. A. Kelly.
13	Mrs. G., Sept. 23	27	Left tubal pregnancy; right ovarian cyst.	Removal of appendages.	48 hours	Recovered.	Dr. C. P. Noble.
14	Mrs. S., Sept. 26	39	Ovarian cyst.	Removal of appendages	36 hours	Recovered.	Dr. C. P. Noble.
15	Mrs. B., Oct. 14,	26	Ovaritis; varicocele of broad ligament.	Removal of appendages.	None	Recovered	Dr. C. P. Noble.
16	Mrs. M., Oct. 19	43	Retroflexion.	Hysterorrhaphy.	None	Recovered.	Dr. H. A. Kelly.
17	Mrs. C., Oct. 24	40	Pyosalpinx; intra-peritoneal abscess.	Removal of appendages.	33 hours	Recovered. (Sinus.)	Dr C. P. Noble.
18	Mrs. L., Oct. 26	30	Gonorrhœal salpingitis.	Removal of appendages.	29 hours	Recovered.	Dr. C. P. Noble.
19	Mrs H., Nov. 30	33	Hydrosalpinx.	Removal of appendages.	3 days	Recovered.	Dr. H. A. Kelly.
20	Mrs. P., Jan. 3, 1890	23	Pyosalpinx and abscess of ovary.	Removal of one uterine appendage.	48 hours	Recovered.	Dr. C. P. Noble.
21	Mrs. C., Jan. 4	28	Ovarian tumor.	Removal of uterine appendages.	48 hours	Recovered.	Dr. H. A. Kelly.
22	Mrs. O., Jan. 28	35	Fibroid of uterus.	Removal of left uterine appendage; right, inaccessible.	48 hours	Recovered.	Dr. C. P Noble.
23	Mrs. J., Jan. 30	29	Double pyosalpinx; abscess of left ovary.	Removal of both appendages; ½ pint of pus.	72 hours	Recovered.	Dr. C. P. Noble.
24	Miss C., Feb. 1	22	Retroflexion.	Hysterorrhaphy.	48 hours	Recovered.	Dr. H. A Kelly.
25	Mrs. S., Feb. 1	28	Ovarian tumor on right side; cystic ovary on left.	Removal of uterine appendages.	5 days	Recovered.	Dr. H. A. Kelly.
26	Mrs. C., Feb. 4	28	Salpingitis and cystic ovaries.	Removal of appendages.	16 days Hemorrhage.	Recovered	Dr. C. P. Noble.
27	Miss B., Feb. 8	19	Dermoid cyst of left ovary.	Removal of left appendage; very dense adhesions	22 days	Recovered.[1]	Dr. C. P. Noble.
28	Mrs. Y., Feb. 27	40	Ovarian tumor on right side; salpingitis on left.	Removal of tumor and appendage on left side.	58 hours	Recovered.	Dr. C. P. Noble.
29	Mrs. S., March 1	32	Salpingitis, double.	Removal of uterine appendages.	48 hours	Recovered.	Dr. H. A. Kelly.

[1] Fecal fistula discovered after 48 hours. After third week fecal fistula closed, and after eight weeks sinus entirely closed up.

No.	Name, and date of operation.	Age	Disease.	Operation.	Drainage	Result.	Operator.
30	Mrs. B., March 7	29	Right, intraligamentary ovarian cyst adherent to ureter; left, tube and ovary adherent; chronic nephritis.	Removal of uterine appendages; chloroform.	Yes	Death 3d day. Suppression of urine after 24 hours. Post-mort.	Dr. C. P. Noble.
31	Mrs. Z., March 13	31	Double hydrosalpinx, size of orange, on right side.	Removal of uterine appendages.	Yes	Death third day from intestinal obstruction coming on after 24 hrs. Organic stricture of colon. Post-mort.	Dr. C. P. Noble.
32	Mrs. McV., March 15	42	Retroflexion of uterus.	Hysterorrhaphy.	None	Recovered.	Dr. H. A. Kelly.
33	Mrs. N., March 20	28	Unruptured tubal pregnancy on right side; salpingitis on left.	Removal of pregnant tube and ovary, also left appendage.	48 hours	Recovered.	Dr. C. P. Noble.
34	Miss V., March 29	21	Ovarian cyst on right side.	Removal of right uterine appendage	48 hours	Recovered.	Dr. H. A. Kelly.
35	Mrs. X., April 3	24	Cystic degeneration of ovaries; double salpingitis.	Removal of uterine appendages.	50 hours	Recovered.	Dr. C. P. Noble.
36	Mrs. C., April 5	40	Tuberculosis peritonei; cancer of ovaries.	Evacuation of fluid and removal of left uterine appendage.	48 hours	Recovered.	Dr. H. A. Kelly.
37	Miss R., April 7	23	Gonorrhœal salpingitis.	Removal of uterine appendages.	36 hours	Recovered.	Dr. C. P. Noble.
38	Mrs. X., April 12	30	Salpingitis with extensive adhesions.	Removal of uterine appendages.	77 hours	Recovered.	Dr. C. P. Noble.
39	Mrs. McC., April 12	...	Myoma uteri.	Myomectomy; removal of right ovary and tube	Yes	Recovered.	Dr. H. A. Kelly.
40	Miss C., April 12	30	Large cystic ovaries; menstrual epilepsy.	Removal of uterine appendages.	48 hours	Recovered.	Dr. H. A. Kelly.
41	Mrs. J., April 15	44	Fibroid of uterus and double salpingitis.	Removal of uterine appendages.	50 hours	Recovered.	Dr. C. P. Noble.
42	Mrs. R., April 15	33	Salpingitis with adhesions.	Removal of appendages; right tube rudimentary with ovary separated from pelvis and attached to omentum.	67 hours	Recovered.	Dr. C. P. Noble.
43	Mrs. W., April 19	39	Intraligamentous cyst right side.	Removal of cyst.	48 hours	Recovered.	Dr. H. A. Kelly.
44	Miss J., April 19	23	Double ovarian tumor.	Removal of tumors; pedicle to right tumor very fleshy.	72 hours	Recovered. Hemorrhage—reopened belly next day and flushed; sutured broad ligament.	Dr. C. P. Noble.
45	Mrs. R., April 22	27	Small ovarian cyst.	Removal of uterine appendages.	48 hours	Recovered.	Dr. C. P. Noble.
46	Mrs. B., April 22	20	Double salpingitis, with ovarian cyst on left side.	Removal of uterine appendages.	78 hours	Recovered. Ether pneumonia.	Dr. C. P. Noble.

No.	Name, and date of operation.	Age	Disease.	Operation.	Drainage	Result.	Operator.
47	Mrs. R., April 26	29	Dense adhesion of small intestines and rectum to pedicle of left tube and ovary resulting from operation one year ago.	Adhesions broken up.	55 hours	Recovered.	Dr. C. P. Noble.
48	Mrs. J., April 27	28	Pregnancy complicated by contracted pelvis.	Cæsarean section.	None	Recovered.	Dr. C. P. Noble.
49	Miss X., May 3	22	Ovaritis; large left ovary.	Removal of left uterine appendage.	43 hours	Recovered.	Dr. C. P. Noble.
50	Mrs. M., May 7	34	Specific tubo-ovarian inflammation.	Ether: removal of both tubes and ovaries with difficulty.	42 hours	Death from uræmic poisoning. Post-mort.: chronic nephritis.	Dr. C. P. Noble.
51	Mrs. K., May 10	37	Double ovarian cyst.	Tumors removed; 4 gals. pus evacuated from right cyst; ligated fleshy pedicle 7 or 8 inches wide.	30 hours	Recovered.	Dr. C. P. Noble.
52	Mrs. C., May 13	35	Double hydrosalpinx, with adhesions.	Removal of uterine appendages.	Yes	Death from septic peritonitis on fifth day.	Dr. C. P. Noble.
53	Mrs. A., May 31	54	Ruptured colloid cyst of right ovary.	Removal of cyst and free colloid material in peritoneum.	2 weeks	Recovered.	Dr. C. P. Noble.
54	Mrs. A., June 2	40	Extra-uterine pregnancy. Ruptured tube.	Belly filled with fluid and clotted blood to diaphragm; appendage tied off.	Yes	Death from acute sepsis within 36 hours? hyperpyrexia; no other symptom.	Dr. C. P. Noble.
55	Mrs. L., June 4	22	Right ovarian cyst; double pyosalpinx.	Removal of uterine appendages.	Yes Belly reopened and flushed.	Death from acute septic peritonitis.	Dr. C. P. Noble.
56	Mrs. B., June 11	27	Double salpingitis.	Removal of uterine appendages	65 hours	Recovered.	Dr. C. P. Noble.
57	Mrs. T., June 19	...	Salpingitis and extensive adhesions.	Removal of uterine appendages.	10 days Slight hemorrhage.	Recovered.	Dr. C. P. Noble.
58	Mrs. W., Sept. 4	40	Ovarian tumor on right side; parovarian on left side.	Removal of uterine appendages; ether.	Yes	Death from ursæmia on third day. Post-mort.: contracted kidneys.	Dr. C. P. Noble.
59	Mrs. S., Sept. 4	30	Parovarian cyst on left side.	Removal of cyst.	72 hours	Recovered.	Dr C. P. Noble.
60	Mrs. B., Sept. 6	34	Pyosalpinx with ovarian cyst on right side; left salpingitis.	Removal of appendages.	10 days	Recovered. Belly reopened for peritonitis; flushed.	Dr. C. P. Noble.
61	Mrs. M., Sept. 13	58	Intra-ligamentous ovarian cyst on left side.	Removal of cyst containing 8 qts. of fluid material.	40 hours	Recovered.	Dr. C. P. Noble.
62	Miss W., Oct 15	30	Fibroid tumor.	Removal of appendages.	2 days	Recovered.	Dr. C. P. Noble.
63	Mrs. Y., Oct. 15	26	Small ovarian tumor and large hydrosalpinx on right side; hæmato-salpinx on left.	Removal of appendages; left ovary not removed.	4 days	Recovered.	Dr. C. P. Noble.

No.	Name, and date of operation.	Age	Disease.	Operation.	Drainage	Result	Operator.
64	Mrs. X., Oct. 18	27	Double pyosalpinx; ovarian tumor on right side.	Removal of tumor and appendages.	4 days 2 tubes.	Recovered.	Dr. C. P. Noble.
65	Mrs. W., Nov. 5	42	Chronic invalidism; adherent cirrhotic ovaries.	Removal of appendages.	5 days	Recovered.	Dr. C. P. Noble.
66	Miss W., Nov. 8	30	Cellulitis right broad ligament.	Exploratory incision.	Yes	Recovered.	Dr. C. P. Noble.
67	Mrs. P., Nov. 19	24	Cheesy tubes with cystic ovaries.	Removal of uterine appendages.	2 days	Recovered.	Dr. C. P. Noble.
68	Miss C., Nov. 23	23	Dysmenorrhœa; constant pelvic pain; cystic and cirrhotic ovaries; neurasthenia.	Removal of uterine appendages.	2 days	Recovered.	Dr. C. P. Noble.
69	Mrs. X., Dec. 10	30	Double pyosalpinx.	Removal of uterine appendages.	4 days	Recovered. Ether bronchitis.	Dr. C. P. Noble.
70	Mrs. J., Dec. 17	24	Ovarian cyst and hæmato-salpinx on left side.	Removal of left uterine appendage.	2 days	Recovered.	Dr. C. P. Noble.
71	Mrs. O., Jan. 10, 1891	37	Double salpingitis; unruptured tubal pregnancy on left side.	Removal of uterine appendages.	32 hours	Recovered.	Dr. C. P. Noble.
72	Mrs. A., Jan. 17	41	Cystic ovaries and chronic salpingitis.	Removal of uterine appendages.	4 weeks Hemorrhage.	Recovered.	Dr. C. P. Noble.
73	Mrs. H., Jan. 17	38	Ovarian cyst on left side; fibroid of uterus; menstrual insanity.	Removal of uterine appendages.	2 days	Recovered.	Dr. C. P. Noble.
74	Mrs. Y., Jan. 22	28	Chronic salpingitis and ovaritis; very dense adhesions.	Removal of uterine appendages.	2½ days	Recovered.	Dr. C. P. Noble.
75	Mrs. C., Jan. 28	42	Tubercular peritonitis and cancer of stomach.	Evacuation of fluid.	80 hours	Recovered.[1]	Dr. C. P. Noble.
76	Mrs. M., Feb. 5	26	Pyosalpinx on right side; salpingitis on left.	Removal of uterine appendages.	2 days	Recovered.	Dr. C. P. Noble.
77	Mrs. P., March 11	33	Ovarian tumor on right side; salpingitis on left.	Removal of uterine appendages.	2 days	Recovered.	Dr. C. P. Noble.
78	Mrs. H., March 11	33	Retroflexion; adherent appendages.	Removal of uterine appendages	5 days	Recovered.	Dr. C. P. Noble.
79	Mrs. K., March 16	38	Double hydrosalpinx.	Removal of appendages.	4 days	Recovered.	Dr. C. P. Noble.
80	Mrs. A., March 16	36	Double hydrosalpinx.	Removal of uterine appendages.	2 days	Recovered	Dr. C. P. Noble.
81	Miss T., March 23	17	Fibroid of uterus.	Exploratory section.	None	Recovered.	Dr. C. P. Noble.
82	Miss S., March 28	34	Rudimentary appendages; neurasthenia.	Removal of uterine appendages.	2 days	Recovered.	Dr C. P. Noble.
83	Mrs. N., Sept. 27, 1890	34	Ovarian cystoma on left side.	Removal of one appendage.	12 hours	Recovered.	Dr. H. A Kelly.
84	Mrs. C., Sept. 27	40	Tuberculous peritonitis.	Removal of right uterine appendage.	Yes	Recovered.	Dr. H. A. Kelly.
85	Mrs. M., Sept. 28	30	Right, ovarian cystoma; left, adherent ovary and tube.	Removal of uterine appendages.	Yes	Recovered.	Dr. H. A. Kelly.

[1] Death from exhaustion on the 11th day caused by constant vomiting excited by cancer of stomach. Had been vomiting for two months. Post-mortem.

DISCUSSION.

DR. JOHN C. DA COSTA: I am glad that Dr. Noble has referred to the risk that sometimes follows flushing of the abdomen. It brings to my mind two cases. They were apparently doing well under the operation, but as soon as the abdomen was flushed they both stopped breathing, and in both there was considerable difficulty in restoring them. Since then I have cleaned the abdomen thoroughly by a stream of water poured from a pitcher, and there is no necessity to pour a great mass of water from a height into the abdomen.

In regard to the danger of uræmia from ether, I think that if Dr. Noble will try cocaine after operation, he will lose a great deal of his dread of uræmia from ether. I have such confidence in it that I do not hesitate to open the abdomen even if the kidneys are involved, provided they are not too seriously affected. Some two or three years ago I reported a case of a woman with phthisis, Bright's disease, insanity, and double hernia, on whom I operated, and I believe her life was saved by cocaine. In that case the urine was down to seventeen ounces, and after the cocaine it went up to forty-nine ounces. My rule is, immediately after the woman comes out from the ether, if there is any nausea to give cocaine at once. It will help to keep the kidneys acting, and it is one of the best anti-nauseants and cardiac tonics that we have.

DR. JOHN B. DEAVER: My experience is that warm water judiciously introduced into the abdominal cavity stimulates and does not depress. In regard to the use of ether, I may say that I have employed it in a large number of cases of bad strictures, which is one of the common causes of surgical kidney, and I have yet to observe a death from this agent. We should be very cautious about the use of chloroform, particularly in this city.

DR. JOSEPH HOFFMAN: I have seen various cases in which flushing was used. In some, the patient was almost in collapse at the time of the operation, and I have yet to see a case in which the operation was followed by any bad symptoms. The hot water has proved a strong stimulant, and has helped to bring the patient out of shock.

DR. NOBLE: I do not oppose flushing. I use it and propose to continue the use of it where much septic fluid has been poured out, because there is no other way to remove it. At the same time, I believe that it has disadvantages. In the first place, when the water is poured through a flushing-tube it is not possible for the operator to control positively the direction which the water will take, and any septic material that may be present in the pelvis may be washed into other parts of the abdomen. I have seen flushing produce shock more than once. This, I believe, is due to the impact of the stream of water.

In regard to ether and chloroform, it is only in the Northeastern portion of the United States that the feeling in favor of ether is at all unanimous. Throughout Europe chloroform is used more frequently than ether; and

throughout the South and West of the United States ether is used scarcely at all. If it were merely a question of agreeing with the majority, undoubtedly chloroform should be used. But it is more than this—it is a question of what is best for the patient; and I am fully convinced that universal experience has shown chloroform to be safer than ether, when the kidneys are diseased or crippled, when bronchitis exists, when the arteries are atheromatous, and in the very young and the very old.

ALBUMINURIA OF PREGNANCY: TWO CASES.

By ANDREW J. DOWNES, A.M., M.D.

[Read April 8, 1891.]

I RECENTLY delivered prematurely two women whose urine contained albumin. The gravity of this condition, the uncertainty of the medical mind as to its proper management, and our lack of knowledge as to its exact cause, induce me to report the cases.

CASE I.—Mrs. W., aged twenty-two years, primipara, consulted me February 19, 1891, about her confinement, for which I gave March 25th as the date. Having been sent for February 25th, I found her pale, nervous, sleepless, and vomiting everything she ate. Her feet were slightly swollen; she made urine freely. On examination it was pale; specific gravity 1020, and contained no albumin. She was evidently hydræmic. Two hypodermics of morphia relieved her. March 2d I found her suffering intense pain in the right side, which yielded in two days to the same treatment as her former indisposition. I saw her no more until March 15th at 6 P. M., when I was informed that she had been acting strangely during the afternoon. She was now fast becoming unconscious. I found she had not passed urine since morning. I was told she had been doing nicely, until this day, since my last visit over a week previous. While anticipating eclampsia, I decided to wait and obtain some urine; at midnight I found her in coma. She had passed a little urine involuntarily in bed. The following morning, March 16th, at 9 A. M. she was still unconscious. Her pulse was full, regular 72 per minute. On introducing a catheter in her bladder about one ounce of urine was obtained, which, on boiling, deposited more than one-half its bulk of albumin. At 10 A. M., with my finger through a tight rigid os, the membranes were ruptured. At 5 P. M., during my absence, she had a severe convulsion, and soon after a more severe one, which was timed, lasting twenty-five minutes. At 6.15 P. M. I saw her, and administered hypodermically ½ grain of morphia with $\frac{1}{75}$th atropia, and *per rectum* 40 grains of chloral. I decided to empty the uterus, there having been no dilatation of the os. At 7.20 P. M. I introduced the first glass dilator, and in twenty minutes had the largest size in. Expecting trouble, I waited thirty minutes for Dr. Fisher, to help, on whose arrival I applied forceps by high application, and in twenty minutes had delivered the child alive, thus making the time from the

beginning of dilatation to delivery of child little more than an hour, which allows half an hour of inactivity. The child lived but half an hour.

Convalescence was uneventful. The urine, five days after delivery, deposited, on boiling, about one-sixth of its bulk of albumin. On the eighth day not more than one-tenth appeared. On the twelfth day there was no albumin in the urine.

CASE II.—Mrs. S., aged twenty-six years, expected to be confined April 16th. About March 1st the fœtal head descended into the pelvis. March 8th her symptoms, especially a puffy condition of her legs and hands, caused me to examine carefully her urine. It contained no albumin. March 11th her ankles began to swell, and her feet were quite swollen on the 16th, on which day she began, at 3 A. M., to suffer intensely from headache and nervousness. The urine became scanty. On examination, the 17th, it showed a specific gravity of 1016, and on boiling one-third of its bulk was albumin. Not more than six ounces were passed in twenty hours previous to 8 A. M. of the 17th. I advised an early delivery, but on the morning of the 18th labor began naturally, and at 4 P. M. I had delivered her under chloroform of an eight months' child. She made a good recovery; the child is doing nicely.

Albumin was present in her urine in decreasing quantities until the 21st—five days after labor—when it disappeared, not to return.

These two cases are quite similar. In both albumin appeared in the urine, but a short time before any symptoms of moment. In both suppression of urine came on suddenly. In both the urinary flow was established, and the albumin disappeared soon after delivery of fœtus. The first patient was distinctly hydræmic and nervous for some time before the appearance of albuminuria. The second is a pale, delicate, small woman who, at twenty-six years, is in her fifth pregnancy. In the first case art empties the uterus, and relieves all symptoms. In the second case Nature does the same at month before term, and averts coma and convulsions.

Both cases emphasize a fact now well recognized—that in such cases we should be on the alert and ready to act.

Both cases show that convulsions are final symptoms. Coma had existed eighteen hours before a convulsion in the first case. The second case did not escape eclampsia. On five different occasions during the day previous to delivery the patient had attacks of tremor marked in lower jaw, and moderate clonic spasms of some muscles, especially the sterno-cleido-mastoid. Masked eclampsia, relieved by hypodermics of morphia.

In conclusion, a word about theory. Case I., on examination February 25th and afterward, showed a tight, rigid os. Within the uterus, in the lower median quadrant, very close to the os behind the symphysis pubis, could be felt a body of considerable density, which

was the placenta. During uterine contractions with the head about to engage at the brim, pressure would naturally be made on the placenta. Case II. suffered greatly from the time the head descended into the pelvis, two weeks before delivery. After that the child's motions seemed strangely queer to the patient, and cramped her. It was at this time the general œdematous condition developed. These facts have some bearing on the pressure theory. That they were factors in a reflex vasomotor disturbance, culminating in sudden suppression of the renal function, with consequent retention in the blood of products ordinarily eliminated, there is reason to believe.

ADDENDA.—April 25th I delivered a third albuminuric woman.

CASE III.—Mrs. W., aged twenty-five years, primipara. Labor began normally at 8.30 P.M. April 24th; at 11.45 P.M. I saw her for the first time in four weeks. Labor was well advanced, the os quite dilated, and the head engaged at the brim. She had been in excellent health, and did not mind a marked œdema extending above the knees. She was on her feet every day from morning until night, and explained it to her own satisfaction. She had made urine shortly before my arrival, and had vomited in same vessel; what I considered urine, on boiling showed albumin. The anasarca alone induced me to examine it. Deciding to hurry labor, I administered chloroform at 1.30 A.M., and at 2.15 A.M. had delivered the child by high application of forceps. A normal placenta was expressed in twenty minutes. Suddenly, at 2.50 A.M., the patient had a severe convulsion; at 3.10 A.M. a second one, and at 3.40 A.M. a third and last occurred. Within an hour from the first convulsion she had taken under the skin $\frac{1}{4}$ grain morphia with $\frac{1}{75}$ grain atropia, and by the mouth 30 grains chloral. At 10 A.M., seven hours after delivery, I withdrew over a pint of urine having a specific gravity of 1016, and depositing, on boiling, one-third its bulk of albumin. April 30th, urine for the first time was not albuminous. Mother and child are well.

This case gave no symptoms except the œdema, which began with the occurrence of lightening two weeks before labor; no headaches, no pain, no nervous phenomena, no lessening of the urinary flow. The pressure theory enters largely into any explanation. The descent of the tumor, the subsequent anasarca, with unusual œdema of the vulva, may have the relation of cause and effect. The child's head gave evidence of having been pressed at the inlet for some time by an encircling depression of scalp nearly equidistant from vertex. The head was large.

SOME NEW POINTS IN THE TREATMENT OF TUBERCULOSIS.

By LAWRENCE F. FLICK, M.D.

[Read April 22, 1891.]

On November 12, 1890, I read a paper before the Philadelphia County Medical Society, in which I casually called attention to the use of iodoform by inunction in the treatment of tuberculosis. At that time my experience with this method of treatment was so limited that I did not care to announce my results, except in the most general way. Since then I have treated a comparatively large number of cases by this method, and with such results as will justify me in speaking in positive terms about the matter, and bringing it before you for your consideration. I will first give the clinical history of some of the cases which I have treated, and will then lay down some rules of practice which I believe can be deduced:

Case I.[1]—Female, aged twenty-six years, single, housekeeper, in comfortable circumstances; has been tuberculous for about two years. Has had two sisters die of tuberculosis. Took the disease herself whilst nursing one of her sisters. Had small deposit in apex of one lung, was coughing a great deal, was losing flesh rapidly—in short, had all the symptoms of the early stage of tuberculosis of the lungs. Went to the country to live, and remained there about six months. Returned very much improved in health. Cough had almost entirely disappeared, and the lung had cleared up, but she had not regained her weight. Shortly after returning to the city she again began to cough and lose strength. An ulcer developed in the right lower eyelid, which grew to the size of a silver quarter-dollar, and which she believed to be a stye. After applying home remedies for some time without obtaining any relief, she consulted me about the eye. Found her general condition much worse than it had been at any time. There was some impairment of resonance over both apices, she was coughing a great deal, especially in the morning, had no appetite, was pale, and complained a great deal of lassitude and indisposition to work. In the lower eyelid there was an ulcerated mass which upon the

[1] Cases I., II., III., VIII., and IX., were exhibited to the physicians present at the meeting.

mucous surface secreted pus. Microscopic examination of this pus showed tubercle bacilli. Ordered her pepsin, hydrochloric acid, digitalis, and calisaya bark internally; inunctions of saturated solution of iodoform in cod-liver oil, and calomel dusted on inner surface of eyelid. Kept up this treatment for some time, when the dusting of calomel was discontinued on account of irritation, and inunctions of iodoform and tonic treatment alone used. For a time, also gave iodoform by the mouth, and for a very short time gave creasote internally. The main treatment at all times has been iodoform inunction, and during a considerable part of the time no other treatment has been used. At the end of six months' treatment all external signs of lupus had disappeared, and the internal surface of the eyelid was almost normal, there being merely a slight thickening of the mucous membrane. The lungs had entirely cleared up, as far as could be made out by physical examination. There was no cough, no feeling of fatigue—in short, no symptoms known to the patient indicative of disease. She had gained about six pounds in weight, and was gaining at the rate of one pound a week. She continued, however, to have a tubercular appearance, and informed me that she always had a very high color in the evening. Recently she has had an attack of influenza, from which she has not entirely recovered as yet. She has at present a slight impairment of resonance over right apex, and some prolongation of expiratory murmur, both of which symptoms have come on since she had influenza.

CASE II.—Boy, aged about twelve years, going to school, of a poor but most respectable family, began to show symptoms of tuberculosis about nine months ago. Every member of his family has had or now has tuberculosis, and his father, mother, and one sister have died of the disease. Disease first showed itself by malaise, fever, hemorrhages, and a very severe cough. Had anorexia, and rapidly lost flesh. Put him on the usual treatment for acute tuberculosis, without any apparent effect. After a short time I stopped all internal medication and put him on iodoform inunctions. For a short time also gave him creasote internally. From the time inunctions were begun, his condition improved, and he gradually ceased coughing, regained his strength, gained in weight, and at present, after six months' treatment, is apparently perfectly well. The only treatment used for any length of time was the inunctions.

CASE III.—Sister of Case II., aged about twenty-four years, housekeeper; began to develop symptoms of tuberculosis about a year ago. Disease first manifested itself by breaking down of axillary glands. Rapid emaciation followed, and a severe dry cough. Had some symptoms of tubercular trouble in pelvis. Put her on inunctions of iodoform solution, and gave her creasote internally. After a short time, discontinued the creasote and kept up the inunctions. Pelvic symptoms entirely disappeared, appetite became very good, cough disappeared, and her general condition improved. For a time I was under the impression that this case had recovered, but within the last few weeks she has again developed some cough, and has other symptoms of a recurrence of the disease. She has been closely housed up nursing her dying father, who has just succumbed to the disease, and it is possible that this has contributed to her relapse.

CASE IV.—Male, aged twenty-five years, meat-vender, in very good circumstances; has been tuberculous about a year. Was under skilful treat-

ment for three months prior to coming to me. At the time I first saw him he had lost twenty-three pounds, felt very weak, was very short of breath, had no appetite, coughed a great deal—cough keeping him awake at night—and had morning diarrhœa. Put him on inunctions of iodoform and tonic treatment. After a few weeks gave creasote internally, in addition to the inunctions. At the end of two months' treatment he had regained nearly all the weight he had lost, had an excellent appetite, coughed very little, bowels were normal, was able to walk long distances without getting short of breath, and presented the appearance of general good health. About this time he had a severe attack of influenza, which came on suddenly with a temperature of 105°, running a very severe course, and which left him so prostrated that he is only now beginning to be able to be about again. A recrudescence of the tubercular trouble has undoubtedly been started by the attack of influenza, but nevertheless his condition is at present good. His weight at present is nearly the same as before he had the attack of influenza.

CASE V.—Male, aged twenty-four years, metal-spinner, in comfortable circumstances; has been tuberculous about two years. No consumption in his family. His first symptoms were those of abdominal tuberculosis. Had a fistula cut about a year ago. When he first came to me, about six months ago, he had just been compelled to lay off from work. He had lost twenty pounds in weight, had a harassing cough, but no expectoration, was very hoarse, had sore-throat, no appetite, and felt generally broken up. Gave a history of having had a severe hemorrhage in the beginning of his disease. Could find very little evidence of lung disease, the only physical signs being impairment of resonance over left, and some harsh breathing over right apex. Put him on iodoform and pepsin by mouth. Kept him on this treatment for a few weeks, with the result of improving his appetite, but with no other apparent improvement. Put him on inunctions of iodoform, and gave him tonics by the mouth. After some weeks, stopped the tonic and gave him creasote by the mouth, continuing the inunctions. Shortly after beginning treatment with me he resumed work, and has been working ever since. When he last reported to me he was enjoying comparatively good health, had gained about thirteen pounds in weight, had a good appetite, felt strong and able to work, but still coughed a good deal. I have hunted him up within the last few days, and found him in about the same condition as when he last came to see me. He has not used my treatment since he left me.

CASE VI.—Male, aged twenty-six, letter-carrier, in comfortable circumstances; has been tuberculous about five years. Disease progressed very slowly at first. When he came to me about six months ago, he had a large cavity in right apex, was coughing very much, was vomiting, had poor appetite, and his general condition was rather bad. Put him on tonic treatment, and after some time gave, in addition, iodoform by the mouth. Later on, also put him on inhalations of creasote. Kept him on this treatment for about six weeks, during which time his appetite improved, and the vomiting ceased, but his general condition remained about the same. Continued the tonic treatment, and put him on inunctions of iodoform. During the first month of this treatment he gained seven pounds. General condition also improved. Cough became much less, expectoration decreased, and patient became quite vigorous. Continued inunctions and put him on creasote internally in large doses.

Patient continued to do well for several months, when he took a trip to Florida. After a few weeks he returned with the disease again active. Has rapidly lost ground since. Is at present in bed with acute symptoms. Has consolidation of the apex of the other lung.

CASE VII.—Female, aged twenty-two years, store-girl, in comfortable circumstances; has had one brother die of tuberculosis, and has herself been tuberculous about two years. Disease probably began in the pelvis. When she first came to me she had what she termed a stomach-cough. Could find no evidence of tubercular deposit in the lungs. Put her on tonic treatment, and treated her for pelvic trouble. She got along well, but did not gain in weight. Put her on inunctions of iodoform, and gave her creasote internally. Under this treatment she gained upward of twenty pounds in about two months. All the symptoms improved, except the cough. Recently had a severe attack of influenza, since which time she has had a recrudescence of the tubercular trouble, and an evident extension of the disease. Cavities are forming in the lungs, and it looks as though the case would run a rapid course.

CASE VIII.—Male, aged thirty years, tinner, in comfortable circumstances; father died of tuberculosis; has been tuberculous about four years. First had what appeared to be a mild attack of apex pneumonia, from which he apparently recovered. About six months afterward had a severe hemorrhage, which was followed by acute symptoms of tuberculosis lasting for several months. Again got about, and was able to go to the country for the summer. Returned in autumn, considerably improved. Acute symptoms set in during the ensuing winter, which confined him to bed for several months, and almost proved fatal. He was too weak to go away in the following summer, but toward autumn regained sufficient strength to enable him to get away for a few weeks. At this time he weighed ninety-five pounds, was extremely short of breath, had night-sweats, a distressing cough (which was being controlled by opium), anorexia—in short, all the symptoms of the last stages of phthisis. His lungs were riddled with small cavities, and he had some large secreting cavities. I put him on inunctions of iodoform, and gave him creasote internally. He at once began to improve slowly. At present, after six months' treatment by this method, he weighs 115½ pounds, has a most excellent appetite, expectorates very little, has no sweats, no distressing cough although he is not taking any opiate, can walk from twenty-five to thirty city squares without fatigue, and has the appearance of fair health. The only distressing symptom that remains is shortness of breath, and that is improving. His chest is considerably deformed and contracted, and the physical signs show the lungs to have been seriously damaged. He is at present steadily gaining at the rate of about half a pound per week. That the improvement in this case is due to this treatment there can be no doubt, as he has been under my care from the beginning of his illness, and I had used every method of treatment on him of which I had any knowledge.

CASE IX.—Female, aged twenty-three years, no particular pursuit, in comfortable circumstances; was well until three months ago, when she took what appeared to be acute tuberculosis. Had very severe pains in region of pelvis, slight fever, anorexia, sleeplessness, and great prostration. Before being taken sick she weighed 128 pounds, and at the end of two months, although the acute symptoms had subsided, was reduced to 105½ pounds.

Could find no evidence of lung trouble at any time. Kept her on tonic treatment, and phenacetine for reduction of temperature for several weeks without much influence. Put her on inunctions of iodoform, and kept up the tonic treatment. Appetite at once picked up, and she is at present improving very rapidly. She has gained six pounds, and her general condition is much improved.

CASE X.—Male, aged fifty-five years, laborer, in comfortable circumstances; has been tuberculous about six or eight months. Has catarrhal phthisis. When he first came under my treatment he was confined to the house, and suffering very much from shortness of breath. Had no appetite, coughed a good deal, and spat yellow sputa. Has been under treatment with inunctions of iodoform, tonics and creasote internally, for about two months. During the last four weeks he has gained four pounds in weight. At present he is able to be out every day, has a good appetite, does not spit much, and sputa are almost entirely white. His condition is much improved.

With these cases as a basis, I believe that I am justified in drawing deductions, and in announcing that I can offer some new points in the treatment of tuberculosis. The drugs, upon the use of which I feel that I can offer some new suggestions, are iodoform and creasote. I feel confident that iodoform is a specific in tuberculosis, when properly applied, and will cure where the disease has not yet advanced beyond the stage of deposit. I have for years used iodoform by the mouth in the treatment of tuberculosis, with good results, but it is only since I have used it by inunction, dissolved in cod-liver oil or in olive oil, that I have recognized its real value. Its curative powers are, however, limited to those cases in which the circulation has not yet been cut off from the deposit. Such are, apparently, Cases I., II., and IX., of the cases that I have reported. In cases which have advanced to the stage of breaking down, it acts much better when reinforced by large doses of creasote. I am quite sure that such cases will do better under treatment by both drugs than either drug by itself. Creasote seems to be specially indicated in the advanced stage of the disease. Iodoform is soluble in cod-liver oil or olive oil to the extent of about one in sixteen parts, being a little more soluble in cod-liver oil than in olive oil. When cod-liver oil is used it should be as fresh as possible; otherwise, the solution will turn black in a few days. A good, fresh oil will hold the iodoform unchanged for several weeks. The offensive odor of the iodoform is not much recognized in the solution, and what there is of it can be pretty well covered by oil of anise, and the unpleasant odor of the cod-liver oil, which is really the most objectionable, can be covered by a little oil of rose.

I have a few times seen what seemed to be toxic symptoms follow

the inunctions, but they disappeared soon after the inunctions had been intermitted. I have the patient well rubbed with the solution once a day. I advise the rubbing to be kept up for one-half to three-quarters of an hour. The front of the chest and the inside of the thighs take up the solution most readily.

The creasote I give in large draughts of hot water, as hot as can be taken. I begin with drop doses, and run it up to thirty or forty drops a day. I have had to intermit it a few times on account of a smoky condition of the urine, but usually patients bear it well.

To sum up the result of my treatment by this method, I may say that, of the ten cases, one is apparently entirely well; three are apparently approaching a cure, and will probably get entirely well; four have had the disease arrested, and are at present in a very comfortable condition; and two have had relapses after having been very much improved, and are at present laboring under acute symptoms. In all the cases there has been a large increase in weight, ranging from six to twenty-two pounds.

I may say further, that the cases have not been selected. I have included in my report all the cases of tuberculosis which I have been able to induce to try the treatment, and which I have been able to keep under observation for any length of time, with a single exception, and that case had both abdominal and pulmonary tuberculosis in the advanced stage when I began the treatment. Upon it the treatment had no beneficial effect that I could observe, although the patient thought that the inunctions eased her, and continued them until her death. She, however, refused to take the creasote. I have a considerable number of cases under treatment by this method at present, all of which are apparently doing well, but they have not been under observation long enough to justify me in including them in my report.

DISCUSSION.

DR. ERNEST LA PLACE: From the very first, Koch announced that if successful at all, his treatment would be most successful in light cases of tuberculosis. Among these, the greatest success would be achieved in those which exist close to the surface of the body, so that whatever débris may be formed can be rejected readily. The surgical cases to be treated by the lymph are to be divided into two classes: one in which the surgical trouble is entirely superficial, as in lupus, and those in which the trouble exists deeper in the

tissue, as in white swelling or bone tuberculosis. All cases of lupus will react sooner or later under the influence of the lymph. The rule is to begin with half a milligramme and double the dose each time until you find a reaction, which reaction will come before five centigrammes have been injected at one dose. Then the reaction can be obtained at every succeeding dose by increasing the quantity. This reaction causes great hyperæmia and secretion of the parts, followed by gradual healing until what was formerly an ulceration will change to a smooth, although red, surface. I am still to see a case of lupus that has not undergone these changes, and I have seen over eighty cases of lupus treated. At present I have eight under my charge, and they have all undergone this change. In some of these cases I had a little trouble in completing the cure. In the first three cases, which were cured at least for the moment, small nodules developed after three weeks cessation of the treatment, and then the treatment was renewed. These patients are now comparatively well. I think it well, however, to keep them under small doses of the lymph—two to four milligrammes.

In regard to other forms of tuberculosis, I will relate one case which terminated fatally, and from which you will gather information to guide in subsequent cases. The case was that of a boy sixteen years of age, who had been in the Philadelphia Hospital for a number of years suffering with joint-tuberculosis involving the knee-joint, the ankle-joint, the wrist-joint, and the tibia. He was given an initial dose of one milligramme, which was increased, until after three weeks' treatment he was taking one decigramme; after taking this dose he seemed to react, and, according to Koch's direction, we let him alone. He increased in weight and apparently was doing well. Although he seemed to react, there was no perceptible change in the local manifestations of the disease. There was a greater amount of discharge during the treatment, and the indication was to cut down and remove whatever dead tissue was present. The patient having rested for three weeks, we resorted to sequestrotomy and scraping of the bone. I operated in the popliteal region and removed the diseased structures. In ordinary cases of bone trouble it is often difficult to distinguish diseased bone from what is comparatively healthy. In this case, on the contrary, there was quite a line of demarkation between the healthy and the diseased bone; in other words, nature had tried to eject the diseased bone, but had not succeeded. There was no excessive hemorrhage following the operation, and the wound was packed so that it would heal from the bottom. Some eight other wounds were made and the diseased tissue removed. The patient did well for eight days, when he became very restless and pulled the packing from the wound. The nurse was surprised to find blood on the floor, and, on lifting the covers, found the bed filled with blood. The boy died from the effect of the hemorrhage. The post-mortem was held the next day. The liver was found to be hypertrophied and fatty, the kidneys likewise. Both lungs were perfectly healthy, but the pleura over both lungs was adherent. The heart was adherent to the pericardium throughout. The veins appeared to be normal. In the aorta about a quarter of an inch above the aortic valve were three small nodules; I could find no tubercle bacilli in them. Whether or not the injections were responsible for these extensive changes I am unable to say.

I have treated several cases of fistula in ano, one without scraping and the

other after having scraped them.. All of them got well. In an old case of sinus from hip-joint disease in an old man, the sinus not closed for twelve years, after two weeks treatment it healed and has not been open since.

I am not prepared to express an opinion as to the positive work of this remedy. It certainly attacks tuberculous tissues. The rule that I would suggest would be, that, if after using the lymph for a week or more you find that the treatment causes the patient to lose in weight, and causes lower vitality, then the treatment should be stopped. Continue the treatment only if you find that in spite of the treatment the vitality can be kept up by dietetic and hygienic management, to secure elimination of the destroyed matter.

PROFESSOR HENEAGE GIBBES, of the University of Michigan: I would ask Dr. Flick if he has carefully examined the livers of these patients to see if there is any enlargement? Dr. Shurly and I gave up the use of iodoform twelve months ago, because we found in animals subjected to its use large areas of fatty infiltration in the liver. Iodoform if packed into a tubercular cavity will cure it, and this was one of the points that led to the development of the idea which Dr. Shurly and I have worked on toward formulating a cure for tuberculosis.

What is tuberculosis? Tuberculosis is a disease process, and tubercle a disease product. I am prepared to say that there are two kinds of tubercles which are not mixed in the same individual. I put this on record in 1882. The tubercles which I found in guinea-pigs were not the same as we find in acute miliary tuberculosis in the human subject. This we know is a reticular fibrous tissue with giant-cells and a necrosed centre. These guinea-pigs did not have such tubercles. If you take a certain number of cases of acute miliary tuberculosis dying in the early stage, cases which seem to be exactly like each other, when you come to examine the lungs you will find that they separate into two classes, in one of which we find the true tubercles, consisting of the fibrous reticulum with giant-cells, and another consisting of inflammatory matter. In these small inflammatory nodules you will find the tubercle bacilli in large numbers, while in the other you will fail, in some cases, to find a single bacillus. Another important fact is, that in the reticular form it is a chronic change of the interstitial tissue of the lung, and if examined in the earliest stages you will fail to find any inflammatory action in the surrounding tissue.

In an ordinary case in which we say that the individual has taken cold, and that it has settled on the lungs, we mean that there has been a bronchitis, passing into a catarrhal pneumonia, and that a portion of the lung has become solid, and the consolidation has broken down, becoming caseous and communicating with one or more bronchi, and the softened material has been thrown off. If the disease is very acute you have phthisis florida. Here you have the sputa loaded with tubercle bacilli, which are characteristic, being twice or three times as long as under ordinary circumstances. Where do the bacilli come in? Did they cause the bronchitis or the catarrhal pneumonia? On the other hand, take another condition of the lung, where you have tuberculosis. You examine the lung and find cavities, and at the post-mortem you will find fibrous tissue at the edge of the cavity and a thickening of the tissues, and outside you will find a number of small tubercles. What started this? We have no history of exposure, but we have a

growth in the lung. These are not inflammatory growths. If the bacilli were the cause of this we should find them in an early stage of the induced lesion. It seems to me that the tubercle bacilli have something to do with it, but yet it is not quite clear what that is. In the papers read to-night, reference has been made to pelvic trouble and to enlargement of the mesenteric glands. I think that you will all admit that it is a common condition to find strumous glands in the neck; if these glands ulcerate and discharge externally, they may heal up and give no further trouble. If these glands are removed we find that the lymphatic gland structure is replaced by a large-celled growth, and among this, giant-cells, and in certain parts, large areas of caseation. I say caseation because I do not know better. There is one thing that chemists should look up. We do not know what caseation is. It is a name which has no significance. We cannot tell the difference between caseation from the breaking down of inflammatory products and caseation the result of the new growth, tuberculosis. In these we may find chalk-like masses. This shows that there is something which will act on the glands in certain parts of the body and cause a change with the deposit of lime salts instead of going on into an acute form, with breaking down and the formation of pus. What causes this peculiar change? It is not inflammation. There is a distinct new growth. It seems to me that the old idea may have some weight here. Suppose that a child is fed with milk from a tuberculous cow, and that the poison is carried into some of these glands and sets up a change there. We will suppose that this is limited to one or two cervical glands, or it may be mesenteric glands, or it may be that it affects a joint. There is nothing the matter with the lungs, but suppose a surgeon resects the affected joint, we often find tuberculosis of all parts of the body rapidly developing. It seems to me that the surgeon has here liberated a poison and allowed it to enter the circulation. There is one point in which tuberculosis of the cow differs from the same disease in man. In a cow's lung you will often find calcified masses. This is rare in the human lung. The bacillus in bovine tuberculosis is different from that found in the human lung. It is not more than one-third of the size. It, therefore, seems probable that there may be different forms of the bacillus tuberculosis. In the strumous cervical gland we may find a number of tubercle bacilli, and we will find that they are identical with those found in bovine tuberculosis in size and shape. These bacilli are found in the giant-cells in the strumous cervical glands, but you will not find tubercle bacilli in giant-cells in the human lung.

In considering these points, Dr. Shurly and I came to the conclusion that the tubercle bacillus did not hold the position which it was generally considered to hold, and we concluded to leave it out altogether. We considered that there was some chemical substance which might have been engendered by the bovine tuberculosis, and which existed in the caseating masses and furnished a suitable pabulum for the bacilli. We thought that it might be possible to introduce some substance of a chemical nature which would render the morbid product inert. It is possible that tubercle bacilli may not be the cause of phthisis. We should bear this possibility in mind.

DR. WILLIAM M. ANGNEY: We have tried Koch's treatment at the Home for Consumptives, but the results have been disappointing in every way. Only one case has given a good result. That man is now fishing on the

Delaware. He was selected as a favorable case for inoculation. After a number of injections he rapidly gained in flesh, but that is the only case in which we have had a satisfactory result.

We are now trying the treatment of Drs. Shurly and Gibbes. We have now three cases under treatment, but I cannot say what the result will be. I would ask Dr. Gibbes in what class of cases he uses iodine and in what class of cases the chloride of gold and sodium?

DR. J. SOLIS-COHEN: My limited experience in the hypodermatic use of tuberculin has been very unsatisfactory. One case—as fair a case of florid tuberculosis in the second or softening stage, without marked elevation of temperature or night-sweats, as could be selected for trial—was, on the fifth or sixth injection, suddenly hurried to the third stage, with expectoration of sanguineous tuberculous products; and he lost more ground in ten days than I would have expected him to have lost in three to four months. I therefore suspended the injections, and have not renewed them. Had I done so, I fear I would have killed the patient. Since then I have refrained, and have been contented to note the published reports. I would not consider myself justified, at present, in using the treatment in a serious case of tuberculosis.

My experience in lupus—limited to a single case—was likewise unsatisfactory under moderate doses, and immoderate ones I hesitated to use for fear of re-lighting ulceration in a long-cicatrized larynx and palate.

DR. J. H. MUSSER: In the report that I have to make, I wish you to remember that I appreciate the natural course of pulmonary tuberculosis, and how difficult it is to determine the value of any remedy. Of the cases treated at the University Hospital it is necessary to refer to only one or two. There were a number of cases in the first, a number of cases in the second, and a number in the third states of the disease. Judicious experimentation was used in all. These cases have been reported upon in the *University Medical Magazine*. Of cases of incipient phthisis one case has so improved that to all intents and purposes the man is well. The physical signs are practically nil. Another case is still in the hospital and is receiving occasional doses of the lymph; has been retarded in his recovery by frequent attacks of inflammatory rheumatism. In spite of these he has gained weight, his cough has lessened, and there is not much expectoration. The physical signs are practically the same as when he was first admitted. Another case was discharged much improved in every respect, but we have been unable to trace him since. A fourth case is now in the wards of the Philadelphia Hospital with what has been diagnosed as tubercular laryngitis. The physical signs in the lung have not extended and the general condition remains good; it is so good that I doubt whether the chronic laryngitis which we noticed at the University Hospital can be considered of a tubercular nature.

I have had under observation, in private practice, a case which has been certainly most satisfactory. The patient was a friend of Dr. William Gray, of Washington, who insisted that this man should have the treatment. The patient was seized with acute illness in November last, which was followed by tubercular pleuro-pneumonia; I saw him about the first of January. He had well-marked signs of consolidation over the middle third of the lung posteriorly, with such marked bronchial breathing and pectoriloquy that were the microscopic evidences sufficient I should have been satisfied that

there was a cavity. Dr. Gray could find in the sputum no evidences of a cavity, therefore I was willing to admit that there was simply consolidation and thickened pleura. He had fever, lost weight rapidly, and had all the aspect of a case of acute phthisis. The inoculations of the lymph were made by Dr. Gray. The patient gradually improved, and by February had gained in weight and was eating well and the cough had left. The expectoration had lessened and only occurred after an inoculation, and was then loaded with bacilli in large numbers. He got so well that he went to Florida March 1st, and again returned about the first of April. The physical signs of consolidation are markedly less, the rational symptoms of the disease do not exist, and weight and strength have increased much. The inoculations are still continued and he is now making preparations to go West.

I have seen no harm from the use of this agent. I think the mistake has been made in giving injections too frequently. I would advise the cautious use of the agent in certain cases; my mind is in abeyance as to its value.

DR. JAMES TYSON: I can confirm all that Dr. Musser has said. I have recently examined with negative results the first patient to which he referred. In the second case, which I have examined to-day, I find that the physical signs seem to be very nearly the same as when he came into the house. His expectoration has ceased and he has less cough than at first. The total number of cases which we had under observation was between fifteen and twenty. Four of these still remain. One is the last of whom I have spoken. A second is a young girl who seems not to have improved. The two others are under Dr. Pepper's care. One of them seemed to be doing so badly six weeks ago that the treatment was stopped, since which he has slightly improved under creasote and restorative measures. The fourth patient has not had the lymph for some time. There is one case of lupus in our wards, and I can attest to improvement in the appearance of his face. I can place alongside of these four cases others in my own ward which have been under ordinary treatment, where the improvement has been as great, with the exception of the first patient alluded to by Dr. Musser.

DR. GIBBES: In reply to the question asked, I would say, that at the Harper Hospital they take in all cases, and if they insist upon being treated they have to be treated. Some were put under treatment that were too far gone to be benefited. In one of these cases treated with the chloride of gold and sodium, I found that instead of having caseated material in the cavity, the material was converted into a substance resembling wet chamois leather.

DR. FLICK: In regard to changes in the liver, I have not examined the liver, but there have been no symptoms indicating any hepatic trouble.

DR. LA PLACE: In regard to caseation, that is a fatty degeneration resulting from a hyperplasia in the epithelial or the endothelial cells. This caseation may undergo calcareous degeneration. We may find changes corresponding to this in atheroma of the artery. We may have calcareous degeneration in the valves of the heart as a result of a certain amount of irritation produced by acute rheumatism. In the lungs we have the tubercle bacilli acting as an irritant and causing a certain amount of proliferation in the epithelial cells, just as we have a proliferation of the endothelial cells produced in the arteries from the irritation of uric acid. Just as the cells undergo calcareous degeneration in the artery, so it is possible that this

change shall take place in the lung. This constitutes the natural cure of tuberculosis. In regard to the caseation in lymph-glands, I think the following process takes place as a result of the proliferation of the cells: they all suffer from malnutrition and die and undergo fatty degeneration. As far as chronic and acute inflammation is concerned we, of course, must have a certain way of expressing ourselves in order to convey our ideas. Hereafter, it will be impossible to teach a person in regard to acute and chronic inflammation in the same light in which it has been taught us.

When we look at pus we find that it is composed of corpuscles floating in a certain amount of serum. We must consider these corpuscles as dead leucocytes, killed as the result of a ptomaine generated by the streptococcus aureus. Suppose that there has been an irritant other than the streptococcus. Take that something that produces fibroma. This something is irritant enough to cause the birth of new cells but not enough to destroy them. These cells go through their life and change to spindle cells and produce fibroma. If that irritant had been of a chemical nature sufficient to destroy the cells, it would have become an abscess. There is no exact boundary between acute and chronic phthisis. The difference between acute and chronic inflammation is the difference between abscess of the liver and cirrhosis of the liver.

In regard to the difference in caseation under different circumstances, I have nothing to say. I do not think that question has been sufficiently brought to our attention to enable us to give an answer to it.

DR. GIBBES: I wish to say that the cells thrown out in the air-vesicles are not epithelial cells. They are leucocytes which have exuded from the blood-vessels. What has caused this diapedesis of the white blood-cells? These cells never form tissue. That idea has gone out of date. The question that I should like to have answered is, What is the difference between caseation occurring in a simple inflammatory product and the caseation occurring in tubercular material?

I would differ from the last speaker in regard to fatty degeneration occurring in atheroma. Careful examination will show that the endothelial cells have nothing to do with the process. In the earlier stage you will find calcareous granules in the muscular coat. The process here cannot be taken as a representation of caseation.

DR. LA PLACE: Acute and chronic inflammation are relative terms: if the irritant is very strong you have acute inflammation, if it is less irritant you will have a continual slow inflammation.

I did not mean to say that atheromatous degeneration was entirely due to proliferation of the endothelial cells of the arteries, although there is a certain amount of the proliferation of the endothelial cells. There is a certain amount of proliferation of whatever cells have been irritated, and this holds true no matter to what part of the body the irritant is applied.

DR. BALDY exhibited a specimen of

MULTIPLE FIBROID TUMORS OF THE UTERUS

from a woman aged thirty years.

THE NUTRITIVE VALUE OF BEEF PREPARATIONS.

By R. H. CHITTENDEN, Ph.D.,
PROFESSOR OF PHYSIOLOGICAL CHEMISTRY IN YALE UNIVERSITY.

[Read May 18, 1891.]

I HAVE been asked to consider this subject mainly from the chemical standpoint and to furnish some information regarding the nutritive value of the various beef preparations which, as concentrated foods, are at the disposal of the physician and the public in general. It certainly is an important matter, one in which we are all interested, for there are many occasions in a physician's practice where it is a question of nutriment rather than of medicine, and we certainly need as definite knowledge of the nutritive properties of the foods we employ as of the medicinal virtues of the drugs we may make use of.

Let us consider first some of the principles which should guide us in forming an estimate of the nutritive value of a food preparation.

It is a well-understood physiological law that the proteid or albuminous food-stuffs are essential to animal life. They alone contain the peculiar groups of chemical elements necessary for the upbuilding of animal tissues and for the renewal of the worn-out structures of the animal body. The cells and tissues of animal organisms, together with the majority of the animal fluids, are composed in great part, aside from the water they may contain, of albuminous matter or closely allied derivatives. During the life of the organism this material is constantly undergoing decomposition, and to make good this loss new proteid matter must be supplied. An increase in the amount of non-nitrogenous food will not supply the lack of proteid matter, for, as is well known, continued deprivation of the nitrogenous food-stuffs will ultimately result in nitrogen-starvation and death. Hence, no substance can serve permanently as food for the human body unless it contains a certain amount of this peculiar nitrogenized matter in a readily assimilable form. Further, it is not enough that

a food contains a nitrogen, but this element to be of use to the body must be combined in some peculiar way, as in the proteid molecule. Even such closely related nitrogenous substances as collagen and gelatin will not fully take the place of a true proteid, though containing as large or even a larger percentage of nitrogen. This is a point which needs to be emphasized, for we hear so much said about the importance of nitrogen in the economy that we are liable to overlook the fact that nitrogen *per se*, or in the majority of its combinations, is valueless; that it is only in one peculiar form that nitrogen can be utilized by the animal organism, viz.: in the form of proteid matter.

The proteid food-stuffs may therefore well be called the essential food-stuffs, in distinction from the accessory, as the fats and the carbohydrates. They serve a double purpose in the economy: they not only furnish by their metabolism a considerable amount of energy to supply the general needs of the body, but, as already said, they especially constitute the tissue-building and tissue-restoring foods, and as such are absolutely indispensable to the well-being of the organism.

It has been generally assumed that the animal and vegetable proteids have approximately the same nutritive value. This, however, is probably not wholly true, since there is a noticeable difference in the chemical composition of the two forms—a difference which might well be assumed to have some degree of significance. As a rule, although there are marked exceptions, vegetable proteids contain somewhat more nitrogen, and a correspondingly less amount of carbon, than the animal proteids. Now it is well known that nearly all of the nitrogen entering the body in the form of proteid matter is ultimately eliminated as urea, but the amount of carbon contained in the urea is not equal to the carbon contained in the proteid matter ingested; in other words, the proteid food in serving its purposes in the economy is apparently broken down into a urea moiety, containing practically all of the nitrogen together with a portion of the carbon of the original proteid matter, while there remains a carbon-containing residue which may be either oxidized at once or stored up in the body as glycogen or fat, for possible future use. Hence, it has been argued that the lower the content of nitrogen and the higher the content of carbon in a proteid substance, the greater its nutritive value.

This view, which in general favors the idea of a higher nutritive value for animal proteids, must, however, be considered in connection with the relative digestibility and assimilation of the two classes. Such experiments as have been tried (mainly upon dogs) appear to indicate

that the albuminous matter of muscle tissue and the proteids of the blood, for example, are more readily digested and absorbed than many of the vegetable proteids, such as the gluten of wheat, and if this should prove to be a general rule it would constitute an additional reason for assuming a relatively higher nutritive value for the animal proteids.

There is, further, an additional reason for this generally accepted view—one which is dependent upon the association of the proteid, rather than upon the character of the substance itself. Thus, the most common form in which the animal proteids are taken as food is flesh or muscle tissue, in which the albuminous matter of the tissue is intimately associated with the nitrogenous extractives contained in the muscle serum. These latter bodies unquestionably possess stimulating properties, and to this fact is to be ascribed, in part at least, the more invigorating action of the animal diet.

Furthermore, the observations and experience of clinicians the world over have clearly pointed to the greater value of animal food in all conditions, either in prolonged illness or in prostration from any cause, where it is necessary to provide nourishment in a form capable of promptly invigorating the bodily powers, and with the least expenditure of energy on the part of the economy.

It has thus come about quite naturally that beef, being, perhaps, the most convenient form of animal material, has almost universally been employed in the preparation of concentrated foods. At first, from lack of knowledge of the true nutritive value of proteids, the earlier efforts were confined wholly to the preparation of concentrated extracts of beef, in which practically all of the proteid or nutritive matter of the tissue was rejected as either indigestible or worthless. When Liebig's extract of meat first came into use it was looked upon as containing in a small volume all of the nutritive and valuable portion of the tissue. The chemists and physiologists of that date even went so far as to say that the tasteless residue left on extraction of the flesh with hot or cold water was as worthless as a stone, ignoring the fact that this residue of proteid matter could be digested as well as the fresh tissue, and made use of accordingly.

Our knowledge on these subjects has steadily increased since then, and it is now generally known that an extract of beef made after the old plan of extracting the meat with boiling water is practically devoid of nutritive power.

This is shown by the chemical composition of such extracts, as

illustrated, for example, by Liebig's and Armour's extracts of beef, as well as by physiological experiment.

These two widely known preparations I have recently analyzed, and the results, shown in the accompanying table, fully substantiate the prevalent opinion regarding their nutritive value.

It is unnecessary for our purpose to make any comparison of these two products. They are essentially the same, both being composed mainly of the soluble extractives and inorganic salts of muscle tissue, the former representing the waste products of muscle metabolism. The content of nitrogen in both preparations is large, but this nitrogen is not available to any extent for the nutrition of the body. It exists not in the form of proteid matter, but as a part of certain crystalline nitrogenous bodies soluble in 80 per cent. alcohol. One of the most important of these is creatin, a body always present in extracts of muscle, but which has little nutritive power. Introduced by itself into the animal system, it is neither stored up nor used up, but is simply excreted in the urine, practically unchanged. In the same manner, an extract of beef taken as food fails to show any direct nourishing power; it does not diminish the amount of true food required to keep up nitrogenous equilibrium or to sustain the bodily powers. Further, according to Kemmerich, an animal fed upon an extract of beef alone will succumb more readily than a like animal entirely deprived of food. Hence, the nutritive value of meat or muscle tissue evidently does not lie in the soluble extractive matters, but rather in the rejected insoluble proteid portion of the tissue.

Such extracts, however, are not by any means to be considered as worthless; they have, it is true, little value as foods, but, on the other hand, they are possessed of certain stimulating properties which render them of more or less value as stimulants or restoratives. Among other ways this stimulating action is manifested by a quickened and stronger heart-beat, mainly due, it is said, to the large amount of potash salts in the extract. An extract of beef may, therefore, be likened to an alcoholic stimulant rather than to a food.

This, indeed, has for some time been recognized, and hence to supply the demand for a more nutritive product than the ordinary extract of beef there has arisen a class of preparations, under the name of beef juice or meat juice, which are stated to possess the nutritive properties of choice beef to a high degree, as evidenced by the presence of soluble albuminous matter.

Such preparations, however, as I have analyzed fail to show in their chemical composition any evidence of great nutritive power.

Thus, an analysis of Valentine's Meat Juice and of Wyeth's Beef Juice shows them to possess the ordinary characters of dilute meat extracts, with a small addition of soluble albumin. This addition, however, as seen by the analyses, is too small to have any practical significance.

Certainly a food which contains only one-half of one per cent. of proteid matter cannot in any sense be termed a concentrated nutrient. Aside from this small amount of soluble albumin, these preparations are in no wise different chemically from an ordinary extract of beef, except that they are less concentrated.

As illustrations of a somewhat different kind of soluble food, containing considerable soluble albumin, we have Murdock's Liquid Food, and Bovinine, or Bush's Fluid Food.

Chemically, these two food products are essentially the same. Both contain only a small amount of solid matter (16 to 19 per cent.), but this is mostly nutritive, being composed in great part of soluble albumin. The appearance of the products, together with the small amount of mineral matter and especially the small amount of phosphoric acid, would indicate that they are not prepared from muscle tissue, but rather from blood. Further, all or nearly all of the nitrogen in these preparations is available for nutriment, as it exists in the form of proteid matter. Thus in Murdock's Food, if the percentage of nitrogen, 2.29, be multiplied by the factor 6.25, on the assumption that the proteid contains 16 per cent. of nitrogen, the result is 14.31 per cent., just equal to the amount of soluble albumin found. Neither of these preparations are, however, equal in nutritive value to fresh lean beef, unless the soluble character of the albumin should tend to render it more easily available by the system, and thus raise the nutritive value considerably above the point indicated by the percentages of nitrogen or proteid matter.

In Johnston's Fluid Beef, an attempt has apparently been made to obtain a preparation which should possess the stimulating properties of a simple extract of beef and at the same time have the nutritive qualities of the tissue itself. This product apparently consists, as indicated by the analysis, of an extract of beef to which has been added a portion of the insoluble tissue, ground to a fine powder, and the mixture evaporated to a pasty consistency. Apparently, the soluble proteids of the tissue have been coagulated in the process, since the preparation contains no soluble or coagulable albumin.

Of dry insoluble matter, the analysis shows 10.02 per cent., of which 9.12 per cent. is insoluble proteid matter. This practically rep-

resents the bulk of the truly nutritive matter contained in the preparation. The remainder of the nitrogen-containing substance is soluble in hot and cold water, being composed in great part of crystalline extractives, soluble in 80 per cent. alcohol, although there is likewise present some soluble gelatin or gelatoses, apparently formed by the hydrating action of boiling water on the collagen of the connective tissue. These, however, as previously stated, have little or no real nutritive power.

In any preparation of powdered meat, or of other insoluble proteid matter, there is a great tendency for the nutritive value of the product to be impaired through the long-continued drying of the proteid material. The digestibility of the preparation is thereby diminished, and in a corresponding degree its nutritive power. Hence, as you know, the plan has been adopted in many cases of predigesting a portion of the proteid food-stuff prior to its desiccation, by which treatment the proteid matter is rendered partially soluble and diffusible, and hence more readily available, especially for weakened digestive organs. Such preparations, if properly made, must necessarily possess high nutritive value. As an illustration of such a food, I have analyzed a sample of Beef Peptonoids, manufactured by the Arlington Chemical Co., which I understand is prepared from the flesh-forming elements of beef, wheat, and milk.

At first glance, the small amounts of water and mineral matter in this preparation, together with the large quantity of soluble matter (more than half the water-free substance), are strongly suggestive of possible high nutritive value. This, however, is at once contradicted by the low percentage of nitrogen, which cannot mean at the most more than 27.6 per cent. of proteid matter. In reality, about three-fourths of this preparation is composed of non-nitrogenous matter, mainly starch and sugar. Of soluble products of digestion—albumoses and peptone, directly available as nutriment—it contains only 7.31 per cent.; of insoluble proteid matter, about 20 per cent., of which certainly a large proportion is in the form of vegetable matter. Hence, as a concentrated tissue-restoring food, it is far below the possibilities. Taking the amount of total proteid matter as an index of its nutritive value, it is about 1.4 times as concentrated as fresh lean beef.

Another preparation of this same order, but which shows a much more promising chemical composition, is Mosquera's Beef Meal, a predigested, powdered meat. Its composition indicates that, aside from the small percentages of water and inorganic salts contained in

it, the entire product is composed of nutritive matter; in other words, about 90 per cent. of the preparation is nutriment, of which 77 per cent. is albuminoid matter and 13 per cent. fat.

Further, of this 77 per cent. of albuminoid matter, 29.43 per cent. is in the form of soluble products of digestion, albumoses and peptone, ready for immediate assimilation. In other words, nearly all of the dry matter soluble in water (31.26 per cent.) is composed of proteid substances directly accessible for the needs of the body, with a minimum amount of work on the part of the digestive system.

That portion of the product insoluble in water is composed almost wholly of albuminoid matter and fat. This albuminoid or proteid matter (47.8 per cent.), however, is, I think, in a form more easily available for nutriment than ordinary dried muscle tissue. In order to make clear my reasons for this belief, I must digress for a moment to call attention to the character of the digestive ferment employed in the peptonization of the beef tissue. A short time ago it was discovered that the juice of the pineapple contained a ferment capable of digesting proteid matter. This fact has, I understand, been made use of in the preparation of the above food-product, the process consisting essentially in digesting fresh beef with the juice of the pineapple plant until the proteid tissue is partially peptonized, and then desiccating the product.

At present, experiments are being carried on in my laboratory with a view to ascertaining something regarding the chemical and physiological action of this peculiar ferment, which, up to the present time, has not been scientifically studied. The juice obtained from a ripe pineapple is decidedly acid, possessing, on an average, an acidity equal to about 0.3 per cent. of hydrochloric acid. This juice possesses in a marked degree the power of dissolving proteid matters, especially coagulated egg-albumin and blood fibrin. This proteolytic action is apparent both in an acid and in a neutral fluid, the action being most energetic, however, when the fluid is neutral. Such portion of the albumen as is dissolved is converted into soluble albumoses and peptone, but we have noticed that when an excess of proteid matter is present, this excess, although not dissolved, is plainly acted upon, being disintegrated and giving other evidence of some kind of change which apparently renders it more readily soluble in the natural digestive juices than ordinary muscle tissue. For this reason I am inclined to the belief that the insoluble proteid matter of the Mosquera Beef Meal is more readily available for nutritive purposes than ordinary desiccated beef.

Another noticeable feature of this food-product is the absence of all objectionable taste and smell, so generally characteristic of the ordinary peptone preparations.

In this product, then, we have a truly concentrated food, with a high content of available nitrogen, partly predigested, and with a nutritive value at least four times as great as that of fresh lean beef. Taking the average content of proteid matter in lean beef as 19.3 per cent., and fat as 3.6 per cent.,[1] it is evident from the content of proteid matter and fat in the beef meal that the above estimate is none too high, especially when it is considered that a portion of the proteid matter exists in the form of readily soluble and diffusible products, directly available by the system without digestive action.

In the table of analytical results, the nutritive value of the different preparations is based simply upon the total amount of proteid matter contained in them, as compared with the amount in fresh lean beef.

PERCENTAGE COMPOSITION OF BEEF PRODUCTS. ANALYZED 1891.

Constituents.	Liebig's extract of beef.	Armour's extract of beef.	Valentine's meat juice.	Wyeth's beef juice.	Bovinine.	Murdock's liquid food.	Johnston's fluid beef.	Arlington Chem. Co.'s beef peptonoids.	Mosquera's beef meal.
Water (at 110° C.)	20 06	14.03	60.31	57.88	81.09	83.99	39.58	6.80	6.68
Solid matter (at 110° C.)	79 94	85.97	39.69	42.12	18.91	16.01	60.42	93.20	93.32
Soluble in water	...	...	...	...	...	...	50.40	48.14	31.26
Insoluble in water	0	0	0	0	0	0	10.02	45.06	62.06
Inorganic constituents	24.04	28.29	11.30	17.52	1.02	0.66	13.52	5.08	4.23
Phosphoric acid (P_2O_5)	9.13	7.28	4.00	3.94	0 03	0.09	3.91	1.40	1.71
Fat, ether extractives	0.91	1.27	0 78	0.85	1.49	0.27	1.29	2.95	13.60
Soluble in 80 per cent. alcohol	55.72	67.92	29.15	35.08	...	...	34.10	...	...
Total nitrogen	9.52	8.80	2.68	3.25	2.43	2.29	7.38	4.42	12.36
Nitrogen of insoluble matter	...	...	..	...	...	...	1.46	3.25	7.65
Insoluble proteid matter	...	...	...	...	...	...	9.12	20.30	47.81
Soluble albumin coagulable by heat	0.06	0.68	0.55	0.47	13.98	14.29	0	0	0
Soluble albumoses	0	0	0	0	0	0	0	5.44	11.09
Peptone	0	0	0	0	0	0	0	1.87	18.34
Total proteid matter available as nutriment	0.06	0.68	0.55	0.47	13 98	14.29	9.12	27.61	77.24
Nutritive value as compared with fresh lean beef (lean beef = 100)	0 3	3.5	2.8	2.4	72.4	74.0	47.2	143.0	400.0

[1] According to Dr. Letheby.

NITROGEN-CONTAINING FOODS AND THEIR RELATIONS TO MORBID STATES.

By FRANK WOODBURY, M.D.,
HON. PROFESSOR OF CLINICAL MEDICINE IN THE MEDICO-CHIRURGICAL COLLEGE, ETC.

[Read May 13, 1891.]

In connection with the paper of the evening, by Professor Chittenden, upon the "Nutritive Value of Beef Preparations," I have been invited by the honorable Board of Directors to contribute a few remarks upon "Nitrogen-containing Foods and their Relations to Certain Morbid States." Under the circumstances, it is proper that what I have to say shall be made as brief as possible.

At the outset, our attention is drawn to some fundamental physiological facts which must be kept in mind during the discussion of this subject. The human body is now regarded as a unit composed of an aggregation or community of cells. These anatomical elements differ from each other in some respects, but agree in this: each cell consists of two parts, one living and one non-living, corresponding with cell-nucleus and formed material. What is visible to us is the non-living part, or the formed material; the real living part of the organism is hidden from view. Just as in vegetable tissue, the parts that are permanent and solid are composed of the cell-walls, which may remain long after the essential living part or protoplasm of the wood-cell has dried up and disappeared—in a similar way, in the human subject, the various organs and tissues which give it form and substance are not living; the only part exhibiting vital phenomena is the soft, shapeless, and colorless cell-nucleus, consisting of protoplasm or bioplasm. This living substance, in its chemical composition, resembles the various tissues, varying somewhat according to function, but it contains one essential ingredient which is so characteristic as to confer its name upon the whole class—this element is nitrogen. The celebrated dictum, "Without phosphorus, no thought," might be paraphrased

"Without nitrogen, no life." Viewed from the physiological standpoint, the name "azote," applied to this element by Lavoisier, appears remarkably inappropriate.

As a necessary constituent of the tissues, therefore, nitrogen, in a state of combination, is always present in the human body. Since it is found in considerable quantity and in various forms in the excretions, some two or three hundred grains being discharged daily by the kidneys alone, besides what is lost by the intestinal tract and the skin, it is evident that in order to maintain life the supply must be kept up from outside sources. There are two principal directions in which we may look for the supply of nitrogen—(1) the atmospheric air, and (2) the food.

Although the atmospheric air contains about eighty per cent. of nitrogen, we may dismiss this at once as not available, beyond a very limited extent. Experiment has shown that it is not consumed or absorbed in the act of respiration; but a certain amount of air is always swallowed with the food and passes into the stomach, where it may become absorbed by the gastro-intestinal mucous membrane. It is possible that a small quantity is introduced by this channel, especially since it has been demonstrated that a moderate amount of gaseous nitrogen is excreted or exhaled by the skin.

Nitrogen-containing food must, therefore, be regarded as practically the only source of the constant supply of nitrogen which is so essential to the maintenance of the body in a normal condition. In fact, due attention has already been given to this by Liebig, Fick, Wislicenus, Parkes, Pavy, Flint, and others; and the proper relation of the two great divisions of proximate principles of organic origin, the nitrogenized and the non-nitrogenized, have been pretty closely determined. As their results are to be found in all the text-books, I will not refer to them in detail. I may remark, however, in passing, that from the clinical standpoint there appears to be a fallacy underlying all those calculations of dietaries where food values are expressed in grains of nitrogen and carbon, inasmuch as no allowance is made for waste; the entire quantity ingested is supposed to be digested and assimilated In practice we know that the feces contain considerable nitrogen, which is not excretory, properly speaking, but represents the excess of consumption, part of the food having escaped digestion. In nursing infants the feces consist largely of undigested casein. Even adults are not able to entirely digest milk, and if so simple an article of food as milk is not completely assimilated, what warrant have we for assuming that the nitrogenized constituents of peas and beans, or

of animal tissue, will yield their full equivalent of potential force to the organism? On the contrary, we know it to be a fact, that much food-stuff passes through the alimentary canal without having its proximate principles extracted by the digestive organs and the absorbents.

We may, however, both clinically and by physiological experiment, making due allowance for the personal equation, determine with sufficient exactness the kinds and proportion of different foods required to maintain the body in a normal condition. Proceeding on the same lines, we may discover the effects of an excess, actual or relative, of nitrogen; or, on the other hand, we may ascertain the results of deprivation either partial or complete. We may also be able to see some therapeutic applications of the knowledge thus gained.

From the time of Hippocrates, and even earlier, it has been known that health and disease are largely influenced by food, and that the effects of an animal diet are different from those of a diet exclusively of vegetables. A distinction was even made between leguminous and other forms of vegetable food. It was not until our own day, however, that the practising physician possessed sufficient knowledge of the chemistry of food and of metabolism in health and disease to enable him to direct the diet of his patients upon scientific principles. Following the definition given by Hippocrates, "Medicine consists in addition and subtraction, the addition of the things which are deficient and the subtraction of those things which are redundant; he who practises this is the best physician, but he whose practice is farthest from it is the farthest removed from a knowledge of the art"—we can now prescribe viands suited to a deficiency of nitrogen in the system, or substitute others if there is an excess. To the therapeutic aspect of the subject I will now very briefly ask your attention.

Taking up the latter instance first, we find that a diet poor in nitrogen is useful in the several forms of rheumatism, in gout and lithæmia, and also in recurring attacks of biliousness and bilious headache. Scurvy appears to be caused by an absolute, as well as a relative, excess of nitrogen in the food, and I have seen it caused by the use of an excessive amount of fresh meat among children in an orphan asylum. In its treatment, vegetable food relatively poor in nitrogen is usually employed. Some skin diseases, possibly of lithæmic character, are only to be cured by withholding nitrogenized food. It seems possible that a liberal use of meat in the diet may have some connection with the development of cancer, a disease which appears to be on the increase, as was pointed out by Dr. R. A. Cleemann, of this Society, in his "Address on Hygiene," delivered

before the Medical Society of the State of Pennsylvania a few years ago. Dr. W. Mattieu Williams, in a little work on the "Chemistry of Cookery," pointedly directs attention to the large consumption of meat as a cause of various forms of cancer. In families where a hereditary tendency of this kind exists, it is possible that it might be overcome by vegetarianism. Some nervous affections, notably epilepsy and chorea, are greatly benefited by abstention from meat in the food.

Owing to the writings of Roberts, Fothergill, and others, a causative connection between a diet rich in nitrogen and some forms of kidney inflammation or degeneration is now generally recognized. And in the treatment of the various forms of Bright's disease, attention to the diet is generally admitted to be of prime importance. There is a widely spread opinion that nitrogenized food is favorable to the occurrence of inflammation, and for this there seems to be a scientific foundation. Parkes has shown that a non-nitrogenized diet causes lowered blood-pressure and diminished arterial tension. Meat, therefore, is ordinarily prohibited under the antiphlogistic treatment, as it was formerly called. In acute inflammations of mucous surfaces, especially in plethoric subjects, the use of animal food is usually forbidden. This should not be applied too strictly, however, for in some cases of subacute or chronic character a generous and nourishing diet is necessary.

On the other hand, nitrogenized food may be prescribed where there is, from any cause, a deficiency of albuminous principles in the blood; for example, in anæmia or chlorosis. In phthisis this condition is sometimes quite marked, and good results have been obtained from the "beef and hot-water" plan of treatment, and also from the use of fresh bullock's blood, or hæmoglobin, which requires less digestive capacity and is more easily assimilated than muscle-tissue.

Children frequently suffer from a deficiency of nitrogen. Where an infant is reared upon condensed milk entirely the limbs are plump, but the tissues are flabby on account of anæmia. Such children are late in getting their teeth and have little power of resistance against disease. The addition of oat-meal, barley, or rice to the milk will often bring about marked improvement, and may prevent the development of rickets. Just here I might stop to point out the fallacious character of some of the arguments based upon the comparative chemical composition of woman's milk and other foods. Leeds found in a number of specimens of woman's milk that the nitrogenous constituents varied from 4.86 to 0.85 per cent. So that one specimen of

mother's milk may have six times the amount of albuminous material contained in another.[1] This shows the necessity when the child does not thrive at the breast, of examining the milk to find out if it be deficient in nitrogenized constituents. If so, the addition of beef-meal, bovinine or other nitrogen-containing food in an easily assimilable form is advisable.

Eczema in infants, or in sewing women, is often traceable to a deficiency of nitrogen in the food, and Dr. Rohé, of Baltimore, advises the addition of meat-broth and eggs to the diet as an essential part of the treatment. Similarly, in many syphilitic eruptions upon the skin, in broken-down subjects, good food is a necessary preliminary to any specific treatment. Neurasthenia and atonic dyspepsia, which are so often associated in the same patient, especially if he is at the same time anæmic, can only be relieved by nitrogenized and fatty food, administered in a form easy of assimilation and at comparatively short intervals. On the other hand, in diabetes and in obesity, the diet may be largely nitrogenous; but in this case it is because there is a desire to reduce the carbo-hydrates and not because an excess of nitrogen is particularly sought after.

To return to the children, I wish to call attention to the fact that during the period of growth and development more nitrogen is needed than after the body has assumed its full stature. Hence school-children should have a due allowance of meat, and should be encouraged to eat oat-meal, corn, beans, peas, and other vegetables known to contain this valuable constituent.

In the foregoing brief *résumé* of an important and interesting subject, I have not made any distinction between the nitrogenous, proximate principles of animal and vegetable origin. Chemically and physiologically they are nearly identical; but practically there are minor differences of palatability, digestibility, and relative utility, which, at present, our limits will not permit us to consider.

DISCUSSION.

DR. H. C. WOOD: The paper of Professor Chittenden is entirely in accord with my own clinical experience, which long ago led me to believe that these various preparations of beef are about equal in value. Many years ago, before there was any belief in the inadequacy of Liebig's extract, it fell to my lot to make an extensive pedestrian tour in the Adirondacks, and it

[1] Quoted by Starr in his "Hygiene of the Nursery," Philadelphia, 1888.

took the guides but twenty-four hours to find out that Liebig's extract was of no use. We soon proved the utter worthlessness of these extracts in sustaining strength where absolute work was required. I have, therefore, come to trust entirely to domestic preparations wherever I want a concentrated food, and still believe that if we want to have any certainty we must use preparations which are made under our own observation. In regard to Mosquera's meat flour, it looks as though it might be a preparation of value. I would like to know whether the author of the paper believes that medical and physiological chemistry has advanced to that point at which we, as physicians, may rely upon it. I remember that chemical experts taught us that Liebig's extract was invaluable; also would like to know whether peptone is always peptone. I have often wondered whether the artificial peptone was not distinct, so far as the needs of the body are concerned, from the peptone manufactured in the stomach. I have wondered still more whether the peptones that are prepared by means of the intestinal ferments, such as pancreatin, were suited for the needs of an acid gastric digestion. I should like to see these analyses of Professor Chittenden checked by control experiments made in a purely physiological manner.

DR. THOMAS J. MAYS: I must express my high appreciation of the papers read this evening, and I think, from my own experience, both clinical and experimental, that I can confirm the result given by Professor Chittenden in regard to these beef preparations. I think that these beef preparations must have some nutritive value. Whether it is the albuminous constituents in them or not I do not know. Some years ago I made experiments, and came to the conclusion that they contained little or no nutritive value, so far as their albuminoid contents were concerned. At the same time I was much surprised to see from my experiments that creatin and creatinin were certainly nutritive in character, but how much nutritive value they have I am not able to say. I should say, from the preparations that I have tested, that the nutritive value of the beef preparations is due to their organic extractives rather than to their albuminoid elements. I believe that these preparations greatly nourish the patient, but I agree with Dr. Wood, that if you wish to get the best effects from them you will have to prepare them fresh in the sick-room.

DR. JAMES B. WALKER: I was glad to hear the remarks in regard to Mosquera's beef meal, which has not before been called to my notice, and from its analysis and what has been said in regard to it, I am inclined to give it a trial. I have always felt a disinclination to use these preparations of the wholesale manufacturer, though I have used some of them considerably when forced to where convenience suggested them, but believe that the most satisfactory beef preparation is that which we have the nurse make under our own direction. Another reason for not using many of these preparations is the offensive character of most of them.

DR. S. S. COHEN: Professor Chittenden has left little to add in the line of his paper. My clinical experience with beef peptonoids has been satisfactory in cases of failing nutrition, especially in phthisical patients. It has seemed to be absorbed with less expenditure of the patient's energy than is required for simple cooked beef. I have not yet tried Mosquera's preparations, but I feel like doing so. I regret that the author of the paper did not allude to some of the things that we are able to make at home, in the way of predi-

gested meat food. I refer more particularly to beef prepared with the pancreatic ferment, "peptonized beef-tea," in which the whole of the fibre is dissolved, is not at all unpleasant to the taste, and is certainly absorbed very rapidly.

I am sorry that I did not hear Dr. Woodbury's paper, because the value of nitrogenous food has been of interest to me, especially in the treatment of tuberculosis. While we do not know all that is to be known in regard to the ultimate chemistry of the body and the methods by which chemical action is converted into life-force, yet we do know, as Herbert Spencer has more particularly shown, that the explosive nature of nitrogen compounds is of high importance in the physiological actions of the animal body; that when force is to be quickly set free, and to be set free with comparative violence, as in muscular contractions, there must be the requisite amount of available nitrogen compound. It has seemed to me that the phthisical patient in whom the life-energy seems to be at a minimum, is much reinforced by the persistent free administration of nitrogenous food, particularly if given in predigested form. As to whether animal nitrogenous foods alone should be employed, or whether glutinous and leguminous vegetable products may not likewise be of considerable value, I am not able to express a decided opinion. I use the vegetables to some extent, on the principle that man is an omnivorous animal, and his immediate progenitors probably vegetarians. My greatest and most satisfactory experience in the conditions indicating proteid foods has, however, been with animal tissues and products.

I am glad that Professor Chittenden has recalled attention to the observation of Pavy, that after the urea is separated from the products of nitrogenous food there is left an oxy-hydro-carbonaceous residue, equally available for heat and force, as if the carbon-hydrogen compound had been immediately taken into the body. This serves to explain why a diabetic patient can be well fed upon exclusively proteid diet, and why a phthisical patient can be almost entirely nourished upon these foods, to the exclusion, not of oils and fats, it is true, but of sugars and starches, which seem to have a decided influence in aggravating the morbid phenomena.

DR. WOODBURY: I confess that, like Dr. Wood, in a case of great emergency, such as diphtheria, I would prefer to rely upon fresh beef juice, made by slightly broiling beef and expressing the juice in a fruit or wine press. His remarks in regard to peptones are also pertinent. The term peptone is a very indefinite one. One of the results of the investigation of Mitchell and Reichert in regard to snake poison was that one of the principles was identical with a peptone. I have sometimes thought that predigested preparations, which are perfectly harmless when first made, may in the course of time develop some form of poison which may cause symptoms similar to those produced in some cases of meat or corn-beef poisoning. Lauder Brunton claims that the excessive ingestion of peptones may give rise to symptoms of poisoning.

The question of availability enters into the consideration of this subject in many cases. It is not always necessary that we should use the very best agent for the purpose. Sometimes, when we cannot get the best article, others not quite so good may be very useful, and will answer the purpose. I have made some experiments with Mosquera's beef meal during the past year, and pub-

lished my observations in the *Therapeutic Gazette*.[1] This preparation is made with a digestive principle obtained from a species of the bromelacea or pine-apple plant. When the preparation was first brought to my notice I took some of the juice of the pineapple and experimented with it. I found that on treating meat-fibre with it the reaction for peptone was quickly produced. The use of a digestive ferment devised from the vegetable kingdom has some points in its favor over ordinary animal pepsin. It is cleaner, does not require the acid reaction, and may eventually become much cheaper. I have found Mosquera's beef meal a convenient preparation for making a cup of broth at a moment's notice. I have not used the remaining nutritive beef preparations referred to by Professor Chittenden to any great extent. Bovinine I have used, but he has not mentioned a very important principle in it, alcohol, which increases its value as a stimulant. I have made somewhat of a study of dietetic preparations, and am glad to find that Professor Chittenden's analyses confirm my own observation of the relative nutritive value of these foods.

PROF. CHITTENDEN: There are several points which I should like to speak of which have been suggested by Dr. Wood. Of course, there is a chemical standpoint and a physiological standpoint. Both perhaps must be worked out independently, and good is to be accomplished by comparison of methods and results. I have been occupied for many years in the study of the products of digestion, of proteid matter by the gastric juice and the pancreatic juice. I have now completed the study of nearly all of the individual proteid matter. Up to within ten years the products of gastric digestion were called peptones. It has been shown that the so-called peptone of the past is a mixture of albumose and peptone. We do not know exactly how far proteid matter is digested in the alimentary sac. I have made a great many examinations of the gastric contents, and I have found almost invariably albumoses and peptones, but the proportion varied under different conditions. We do know that albumose and peptone are products of digestion, but we do not know how far this digestion proceeds under normal circumstances. We do not know the percentage of albumose and of peptone. No one has proved the presence of peptone in the portal blood. It does not pass as such into the circulation, but is evidently changed in the act of absorption. Of course, the natural digestion is complicated by the digestion in the intestinal track. There are many points in connection with this subject which remain to be unravelled.

In regard to difference in peptones. I think that all physiological chemists believe that there are at least two kinds of peptones. If albuminous matter is digested with gastric juice you obtain peptone. You may digest the peptone as long as you please with pepsin and hydrochloric acid, and there is no chemical change. But if you subject the peptone to the action of pancreatic juice you break up one-half of it, and there is formed leucin and tyrosin, etc. We have a term to express this, and that is antipeptone. We recognize clearly two forms of peptone. How many other isomeric forms there may be I cannot say. The word peptone is used to-day in a general

[1] Therapeutic Gazette, December 15, 1890, page 811.

sense and not in the strict sense of the chemist. It is applied to the product of digestion.

A word as to the nutritive value. Many experiments have been made to prove that peptone, or products of gastric digestion, will suffice to keep an animal alive and in good condition. The results all tend to show that the digestive materials act as nutrients, and that the animals grow and retain their body-weight as well as when fed on ordinary diet.

In regard to the desiccation of proteid material. Desiccated beef, whether predigested or not, is certainly very nutritious and very well digested by the animal organism. I have kept dogs on desiccated beef hash for months, and the result has been that they have been well nourished, and have retained their body weight, and examinations of the excretions show that the bulk of the nitrogenous material has been digested and absorbed.

DR. WOOD: One objection to all these preparations is that the profession has not the slightest guarantee that the chemical analysis made to-day will apply to-morrow. I believe that most of these preparations as soon as they secure any popularity begin to undergo deterioration. I am not certain that the vegetable digestant produces substance identical with that of animal bodies.

DR. WOODBURY: There was one point which I did not discuss in my paper, that is in regard to the use of nitrogenous food in fever. Some years ago, as the result of chemical study, it was asserted by Huppert and Riesell that by the use of nitrogenous food in fever the amount of nitrogen thrown off is increased. That is to say, the use of this food increased body-waste. This was afterward disproved by Immermann, and subsequently by Bauer and Kunstle. I believe that it is now generally acknowledged that the use of nitrogenous nourishment is proper in low fevers; but, as in typhoid, for instance, the practice is not at all established as to how much nourishment shall be given. A few years ago, Dr. Vandell, of Louisville, from his own experience, entered his protest against the routine administration of food to the patients in typhoid fever. He thought that the appetite should be taken as a guide, and, if the patient did not desire food, that it should not be forced upon him. In this part of the country the routine administration of food, especially milk, is almost generally followed when there is no appetite. The question arises: Is milk the best food? Milk is not always perfectly digested, and a certain amount of irritation in the intestine may be set up. Under such circumstances I think that the substitution of broth is almost imperative. We may resort to a combination of meat broth, with a carbo-hydrate, like arrowroot, etc. We should not overlook the advantage of the hot water, which is distinctly stimulating, and is usually acceptable to the patient, as it helps to relieve his thirst and moisten his tongue. Water acts on the kidneys and also stimulates the skin. The brain symptoms—restlessness, insomnia, and delirium—used to be considered as an indication of inflammation, or an inflammatory condition, and an indication rather for depletion than for the administration of food. We are now beginning to see that in many cases of low fever these symptoms are really due to anæmia of the brain, from the small quantity of blood, and also from the accumulation of waste-product in the circulation. If we increase the quantity of fluid by the frequent administration of water, especially water containing nutritive substances, we relieve the anæmia, and help to wash out the excrementitious products.

PROF. CHITTENDEN: There is only one point to which I shall refer, that is, in regard to vegetable peptones being different from animal peptones. It is known that the albumoses and peptone formed by the digestion of gluten, casein, etc., are different chemically from the peptone obtained in like way from egg albumin or para-globulin. We have also found that the albumoses and peptones formed from the ferment obtained from the pomegranate seed is different from the peptone formed in the digestion of egg albumin. What the chemical difference is I do not know.

DR. JAMES COLLINS exhibited an

ATOMIZER FOR SPRAY-PRODUCING.

A FURTHER COMMUNICATION ON A NEW METHOD OF COMPRESSING THE SUBCLAVIAN ARTERY: WITH THE REPORT OF TWO CASES.

By W. W. KEEN, M.D.,
PROFESSOR OF THE PRINCIPLES OF SURGERY, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

[Read May 27, 1891.]

I DESIRE to call the attention of the Society to the method which I proposed some time since for controlling the circulation in the upper extremity by elastic compression of the subclavian artery. (*Transactions Philadelphia County Medical Society*, February, 1890.) This, it will be remembered, was effected by a pad over the subclavian, held in place by the ordinary rubber bandage of the Esmarch apparatus; the elastic bandage being carried from the chest over the back, and then alternately between the thighs and in the opposite armpit.

FIG. 1.

Not long after I made the suggestion I made a trial of it for my friend Dr. Hearn, in the clinic at the Jefferson Medical College Hospital. In this case the application was a failure. The failure, I think,

arose from two reasons. First, the man had a very prominent clavicle and a deeply-seated first rib; and, secondly and chiefly, the pad used was the ordinary roller bandage. The conical graduated pad, as suggested by Dr. Parkes below, is far better.

I received a letter from the late Professor Charles T. Parkes, of Chicago, dated October 24, 1890, recording his use of it in another case in which the absolute control of the subclavian was almost a *sine qua non* for the perfect operative procedure, and in which the method, submitted to such a crucial test, succeeded so well that I venture to quote from his letter. I need scarcely point out that all our former methods for controlling the artery would not have given such command of the circulation as to make the deliberate dissection and ligation practised by Dr. Parkes a possibility:

"Allow me to congratulate you on the perfect success of the plan recommended by you for the control of the circulation in the upper extremity. The adoption of it yesterday enabled me to carry to a successful issue an operation for the relief of an immense traumatic aneurism of the axillary space, following a laceration of the axillary artery by a bullet from a heavy 45-calibre revolver. After the application of the rubber band in the manner you recommend with a compress over the subclavian artery, I laid the aneurism wide open, cleaned out all the clots, and finally found a large tear in the artery, and applied a ligature above and below it without the patient losing any blood. Twelve hours after the operation circulation was so far restored in the limb as to make a successful termination almost certain. I attribute the ease and readiness with which the difficult procedure was accomplished, to the perfect control of the circulation permitted by the adoption of your plan. It is certainly of great value. If an amputation at the shoulder-joint had been required, it could have been done without the loss of a drachm of blood.

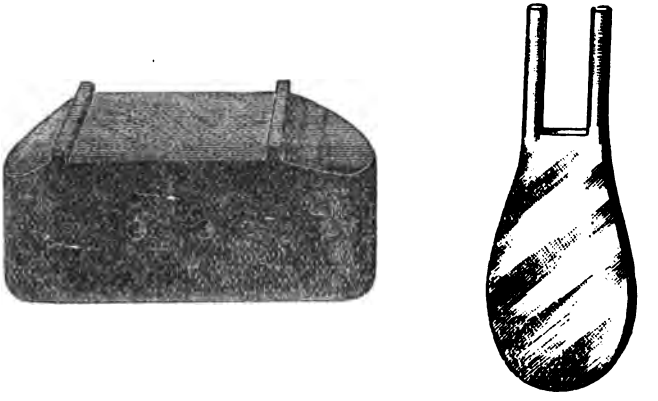
"No more trying test could be given to the method than the case in which I used it. A traumatic aneurism in the axillary space from a large wound in the artery is certainly one of the most difficult things we have to deal with. The application of the bandage in this case enabled me to work deliberately and with perfect ease. No motion on the patient's part can displace it.

"I think the character of the pad used under the bandage and over the artery has much to do with the success of the method. This pad should be somewhat in the nature of a graduated compress, small enough at its apex to fit into the interval between the clavicle and the first rib, and yet thick enough and firm enough to reach well

above the clavicle and the side of the neck, so as to take all the pressure off the rubber."

To answer this purpose I have had made a wooden pad as shown in the figure. The bevelling of the top is for the purpose of enabling

FIG. 2.



the rubber bandage to hold it in place and prevent its slipping either inward or outward. The two holes at the sides and end are for a removable handle, resembling a two-pronged fork, with which to hold it while applying it. Possibly the pressure of this wooden pad may be too severe upon the brachial plexus. If so, it could be made of solid rubber.

I have tried a similar but larger pad for the iliac arteries, but so far its experimental use has not been satisfactory.

DISCUSSION.

DR. MILLER: We are certainly indebted to Dr. Keen for his valuable contribution to the technique of operations in which the subclavian artery is concerned. It often happens that while under ether the patient is difficult to manage or vomiting occurs, and then there is liability of displacement of the key if we rely upon that to control the hemorrhage. Several years ago I amputated at the shoulder-joint in a very muscular man. The patient began to struggle, and there was considerable difficulty in controlling the artery. In that case I should have been much more comfortable had I had the apparatus described by Dr. Keen.

I noticed that the subject on whom Dr. Keen demonstrated the application of the apparatus expressed considerable pain. This is probably due to the length of the pad, which pressed upon some branches of the brachial plexus.

If this pressure were continued for twenty minutes it might lead to considerable injury.

DR. O. H. ALLIS: The one to whom the care of the artery is given in these operations about the shoulder-joint has no enviable position. I do not know when I have been more alarmed during a surgical operation than when I assisted a friend in amputating at the shoulder-joint. It was my duty to control the artery. I passed my thumbs underneath the flap, and as he cut the muscles they contracted so forcibly that it was with difficulty that I controlled the vessel. In compressing the artery to-night Professor Keen probably used more force than was necessary, and this will probably account for the pain.

DR. A. HEWSON: I should like to ask Dr. Keen in reference to the effect of motion of the vertebral column on the apparatus. Would not this interfere? I have this evening seen a friend compress his own axillary artery so as to stop the radial pulse. The pressure seems to be made by the lower part of the trapezius muscle acting on the spines of the scapulæ, and the latissimus dorsi on the humerii, the humerii being rotated inward and drawn downward and backward. The individual was a spare medical man, and locking his hands behind him and then straightening the whole upper extremities, he was able to prevent pulsation in the radial arteries.

DR. KEEN: This is the first time that I have seen pain caused by the application of this apparatus. I think that the pressure was too great. It is possible that India-rubber would be better than ebony.

I do not see how movements of the spinal column or of the clavicle would have anything to do with the position of the pad, which presses directly on the first rib.

I have never seen a case like the one detailed by Dr. Hewson, and should not have thought it possible that the artery could be controlled in this way if I had not his testimony to that effect.

CASE OF EXOSTOSIS OF HUMERUS SIMULATING AXILLARY DISLOCATION.

By JOHN B. ROBERTS, M.D.

[Read May 27, 1891.]

THERE is nothing especially interesting about the patient, whose photograph I present, except the situation of the bony growth.

The boy, who is about eight years old, fell from a pair of steps, and struck upon his shoulders. As he was supposed to be hurt, his clothing was removed, and the condition shown in the photograph observed. The physician who first saw him at once took it for granted that the deformity was due to the fall, and that an axillary dislocation existed. He made unsuccessful attempts to reduce the supposed luxation. Shortly afterward I examined the boy, and found that the prominence, mistaken for a displaced head of the humerus, was an exostosis situated at about the epiphyseal line, between the shaft and the head. This, curiously, had never been noticed before by the child or his parents.

Some weeks subsequently I removed the little tumor by means of chisels, and found it to be cancellated bone partly covered by cartilage. The wound healed promptly under the usual antiseptic treatment.

It is needless to say that the symptoms of dislocation were absent, except that there was a rounded mass of bone to be seen and felt in about the situation occupied by the humeral head in subcoracoid luxation.

THE RELATION OF IMPERFECT SURGERY TO THE SEQUELÆ OF PELVIC AND ABDOMINAL OPERATIONS.

By JOSEPH E. HOFFMAN, M.D.

[Read May 27, 1891.]

So much has lately been said and written relative to the results and, therefore, to the justifiability of abdominal and pelvic operations that it is necessary for the candid critic and honest operator to stop and consider what, on the one hand, is the exact status of the repentant critics and of their changed attitude toward the position and merits of abdominal surgery, and, on the other, how far inexact methods are accountable for some of the failures and misfortunes of what would otherwise be a field of almost unprecedented brilliancy and encouragement in the results that have been obtained.

In the first place it is to be noted that of all the men who have gained prominence in any of the various domains of surgery in general, not one has abandoned that specialty from a surgical standpoint in order to treat it empirically by any other method. Sir Henry Thompson, for instance, has not departed from the exact surgery of the bladder in order to destroy its calculi by solvents or electricity; Mr. Macewen, bone surgery; or Schaeffer, orthopædics. What is meant to be here illustrated is, that when a man has once chosen a specialty and worked up to that specialty by an experience gained by natural selection and application, his specialty has become so much a part of him that its abandonment is just as impossible as the negation of the laws of gravity. His training makes it the law of his mental gravity, and the same laws apply to it as to weight and inertia in the physical world. The greater his experience, the longer his training, the more certain is he in regard to the limitations, the requirements, the possibilities of his work, and as a result of all this his position, when taken, is an entrenched one, from which he is not to be moved and made a weathercock of every shade of opinion, whether of mad-

men, fools or philosophers, for none of these are apt to speak from a practical experience, in surgery at least, and practice, not theory, has made surgery what it is.

That there are specialties in surgery has come about by the consensus of opinion among surgeons in general, and physicians, strictly so-called, that there is need of them. The specialist in any branch is the living embodiment of the necessity of his work. To whom then is the title of "specialist" to be applied? In each branch confessedly, to those who work conformably with their expressed sentiment, or if not teachers whose line of procedure is uniform and the result either of their own experience wrought out by laborious painstaking, or conforms with that of other expert workers in the same line.

To that class of see-saw workers who anon are this and anon are that, the name specialist should not be applied. For accurate, exact surgery, we cannot look to the electrician or the dabbler in it. If one condemns a procedure to-day and extols it to-morrow we are brought to the point of inquiry, Which view is correct, which has the vantage of observation? or perhaps, Is either expression of any value whatever? or is the change made like that of the sleight-of-hand man to puzzle his audience and bring in a set of new admirers to be pleased by the rare and startling exhibition of surgical acrobatics, a surgery in which the constant is differentiated out of sight by the variable.

These inquiries and lines of thought are suggestive of some of the causes we have to consider in the relation of imperfect work to the sequelæ of abdominal and pelvic surgery. What has been said of experience as a necessity for a firm faith in the necessity of any special branch of work, is true with just as much force when the ability to do such work is considered. The appalling eagerness with which men, with only a diploma as a justification and a safeguard from the hand of the law, do abdominal surgery is one of the startling features in the history of this work. In no other branch of the art has there ever been any approach to such audacity. That fools rush in where angels fear to tread has never been more aptly illustrated. Training has been, nay still is, rejected, while the work is sought, and if the patient is found willing to be offered up as an offering to the prurient itch of a surgical pretender, the case is at once reported as a wonderful cure in the hands of the youthful aspirant, or, if unsuccessful, is recorded, heralded, and posted up as a warning against all surgery in general, and against that surgeon in particular who has been rash enough to loan both his instruments and experience to a neophyte with

no other experience than ingrown toe-nails and vaccination, now hiding and excusing himself and his failure behind the experience of the too easy friend, who by a mistaken kindness has martyred both himself and surgery and done both an irreparable injury. I take it that it should be the rule of all surgeons to assist no one who has not studied, observed and assisted in such work. There is no excuse or reason here for men to begin with all the faults and errors of the early operators, and again work out the technique of this branch of surgery in a series of failures and calamities that once well-nigh led to its abandonment. The work of such men cannot be other than imperfect, and must reflect upon surgical interference in these affections in the minds of the uncritical and unthinking. Another class of operators to be carefully watched, is those who, by fair means or foul, are bound to attain prominence. These men have lain in wait for operations, as the moonshiner for a cloudy night, to bring themselves into prominence, let us say notoriety. These men have opened abdomens, not to operate, but to do the first step of an operation. I can this moment put my hands on such a case, in whom nothing was found wrong, but there was a chance to perpetrate a pet fad, and the woman is now dragging out an existence after three subsequent operations, all the result of the first unnecessary tinkering. If we are to criticise abdominal surgery, let us not do so with the results of such operators and their methods before our eyes. Let us rather criticise the crude methods and cruder morals, or if you please, the code that tolerates apprentices and dabblers to do with the bodies of our patients, for the like of which we would ruin the reputation of our tailor or well-nigh mob a cobbler. That such surgery has been overdone is just as true as it is that it has no right to be considered surgery at all. And just here it is to be said that among men of this class, I mean those who have done the kind of work just referred to, we are bound to find our latter-day conservatives and repentants. Of all those who have gained and kept a name as foremost in the rank of abdominal surgeons, we find no recanters. These are almost always to be found in the lines of failure or discouragement or embarrassment. If a man has made blunders, he is a fool not to perceive them; or if the real spirit of surgery is beyond him and he feels it, he alike is bound on the one hand to retrieve past misfortune by so-called conservatism, sitting on the *pons asinorum* of regret, watching the stream of surgery flow by, and with it the hopes that he no more has chance of realizing. On the other, having neither the spirit of surgery within him nor the courage to attain it by drill and application, nothing is left for him but to be a dissenter, to decry

all surgery as mutilation, nothing justifiable but conservatism. From this standpoint I make the plea that each one of us, before he condemns surgery, its justifiability or its results, shall judge of them all. As sensible men and women, saying that we are in need of surgical attention, to whom shall we go? To the apologists for their work, to those who have operated themselves into repentance, who have made an experience only to regret it? Certainly not. Experience and judgment in this work is no more to be gotten in lumps than can knowledge be bought by the wagonload of books.

If there has not been an antecedent experience from which special knowledge has been differentiated, this special knowledge, though it may be wide enough theoretically, practically is cramped and dwarfed. The wider the general experience, the more exact will be the special. Having considered the class of operators we must look to for errors and repentance, let us look at the work as surgery simply, not in the light of the miracles it is supposed and often promised to work. Miracles nothing human can perform. No surgeon has a right to promise an absolutely certain result in every case. I have too frequently heard promised, "The operation will make you a well woman." Patients are persuaded into operation when they should be left to choose it for themselves. I have nothing but condolence, may be contempt, for the surgeon who has to persuade his patients to be operated upon. Herein comes a great deal of the blame of surgery in the abdomen and pelvis. Who ever heard of a surgeon's having to persuade a patient to put a splint upon a broken leg or a ligature around a bleeding vessel? The indications for every operation should be plainly stated, and the patient or her responsible friends be responsible for the decision for or against operation.

The disasters of operation, on the other hand, ought not to be attributed to the inherent danger of abdominal or pelvic interference. We are to remember that, as a rule, except in extreme hemorrhage and in diseases implicating the kidneys, bladder, or ureters, abdominal operations ought to be successful. It is well for all aspiring operators, and for many who consider themselves established, to ponder well the words of Savage. He says: "I think we ought to get into our minds, as a prominent idea, the view that after an abdominal operation a death should be considered to an extent as preventable, and that when one does occur we should hold with ourselves a sort of moral inquest as to the cause, how it might have been prevented, and whether in any way it was associated with aught relating to ourselves. As time goes on, I am more persuaded that in the question of success

or failure, less and less depends on the patient, her conditions and surroundings, and more and more on ourselves and the attention to certain details which have been found to be essential." With such a standard as this a man cannot fail to do the best possible work. High ideals, though they never be quite realized, are a safeguard against the nauseating complacency with which certain operators contemplate their woeful results, blaming either Providence or the nurse, allowing themselves to escape unscathed.

It is well just here to consider Mr. Savage's expression when he says "Less and less depends upon the patient, her condition and surroundings," for this is at once too wide and at the same time widely true. It is just as evident that, while patients go on suffering, time and time again, until they are hopelessly ill, if taken earlier, no matter what their surroundings, they could have been cured. This fact must stand out a perpetual contradiction to those who, in charity advertisements for private aggrandizement, laud in season and out the over-laudatory achievements of hospital surgery. Right here I want to say, that the best results that have ever been gotten in this city in a wide series of cases have been done in private houses, many of them having none of the recognized conveniences either for comfort or ideal cleanliness. The room that the patient occupied was often the only clean one in the house, and yet, as a rule, all of these patients get well. We, as operators, have no business to scare a patient into a hospital for our own convenience.

By doing so we bring into the chances of her recovery an additional element of doubt.

In estimating the importance of the sequelæ of any surgical operation, we must compare them with the gravity of the condition for which the operation was done. Generally speaking, promptitude in ridding a patient of any surgical disease is a step toward avoiding after-complications as well as primary impediment to rapid satisfactory work. If a patient is suffering from suppurative abdominal disease, which by its presence threatens life primarily by septicæmia, or indirectly by secondary implication of vital organs, the fact that a hernia or fistula remains after operation is no argument either against the advisability of operating nor against the results of the operation. The argument rather rebounds against the critics, and should convince them that early operation, while giving the patient a better primary chance for life, secondarily would leave him in better condition to resist the influences that tend to prevent prompt healing and, therefore, conduce to fistula and hernia formation. To appreciate these

and other pathological points, a thorough appreciation of the pathology of pelvic inflammation is necessary. A devotee of the ancient doctrines of pelvic cellulitis has no hope of becoming either a skilful diagnostician in or a surgeon of pelvic disease, since his supposed pathology does not agree with the actual condition of affairs, and hence he is handicapped from the start, and the incubus of tradition must be fatal to his progress.

In advanced cases of tubal and ovarian disease, theory will tell him to treat the disease by derivative measures, aiding himself possibly by closure of a cervix, when lo! the patient grows worse in his hands, and is only rescued by the merest chance by final resort to the abdominal section. In such cases it is no uncommon condition in which there is such a generally vicious state that healthy tissue in which to place a ligature can scarcely be found, and the result is a fistula, through which a ligature ultimately is passed. Here only the most careful technique, of making a good stump, cleaning out necrosed tissue for this purpose, and diligence in using accurately all precautions against infecting the ligature while it is being placed around the pedicle, will prevent the formation of fistula, or at least of the conditions that will result therein. Herniæ are cited as a perpetual menace against the propriety of abdominal operation. Women are said to be worse from them than from their original trouble. In these cases the value of personal opinion goes very little to announce the true condition. The surgeon or the critic of surgery who estimates the value of either medicine or surgery by the reports of the patient will argue from very uncertain and worthless data. Some patients will complain more from a slight hernia than originally they did at the trouble necessitating operation, or at least their complaints are very distinct. In the first they groaned in anguish, begging relief, while at last they repudiate all surgery because they no longer suffer torture at each menstrual period. To this they are frequently encouraged by meddlesome women who, never having suffered, cannot appreciate the tortures of disease, or by malevolent professional rivals who descend to such indecent methods in order to compass the ruin or professional distrust of the community against the operator. As a rule, herniæ and fistulæ especially should be rare. Hernia is a constant danger in fat women, both as primarily owing to the uncertain healing of the fat, and secondarily as a result of weakening the abdominal support. Hence the rule should be in all such cases to keep the patient in bed much longer than is required to heal the incision, and, after getting up, constantly to wear an abdominal support. A failure so to advise is just as cul-

pable as to admit the elastic support over a dislocated patella, and can only occur as the result of sheer carelessness or ignorance of the requirements of this special class of cases. Fistulæ, besides resulting from ligatures, may have their origin in lesions of the intestine resulting from the freeing of adhesions. Fecal fistulæ are rarely persistent, almost never so, and in the great majority of cases can be avoided if a careful watch is had over the bowel involved in the adhesions. Here the result of bad work must result disastrously, both so far as perpetuating the fistula is concerned and in doing damage to the intestine. To obtain perfect results the intestine is so to be mended, not only to prevent leakage of its contents, but also to avoid adhesions compromising its function and conducing to obstruction. In this relation the deaths from intestinal obstruction after operation are to be considered. In the hands of experienced operators this rarely if ever happens, and if it occurs it is recognized and relieved. One death occurring from such cause coming under my knowledge was the direct result of placing the patient shortly after operation in the care of a physician without any experience whatever in a surgical way. The complication accordingly was not understood, and by the time surgical aid was sought the woman was practically dead. Imperfect after-attention of surgeons eager only to operate has been and will continue to be the cause of much reproach to surgery. Until his patient is out of bed and moving about freely, the surgeon has no right to dismiss her as cured. If a hernia occur after operation, it is the duty of the surgeon to explain its nature and make early effort to cure it. The earlier it is cured the less will be the obstacles in the way of permanent relief. To have a patient die of operation for hernia, the result of the surgeon's own operation, ought to be a calamity almost unheard of. Nevertheless it ought to be understood that, owing to the size of the sac, and the consequent extent of the adhesions, some herniæ are practically incurable unless at a great risk. One such case is still fresh in my memory, in which, after a long relief, the hernia again returned. The woman was very fat, and, with the difficulties of a former operation fresh in my mind, I refused another.

There is no use in operating and reoperating in unfavorable cases until at last the patient is lost. Surgery nor the surgeon receives credit, while the patient receives no benefit. Imperfect knowledge of how to drain is at the bottom of many failures in the surgery of the abdomen. I once knew the question to be asked by a man following up the matters of abdominal surgery, very far off to be sure, "How long does the tube stay in—till it smells?" I have seen a tube removed

containing more than an inch of coagulated serum, this last in the hands of an operator who ought to know better than now to advise the cleansing of the tube once every twelve hours, or some such long interval. A drainage-tube that needs cleansing or emptying only once in twelve hours had better be kept clean in the bag until it is wanted. Such advice as to the use of the tube is worse than worthless. To be valuable, information must come from those who are informed, not from those who are guessing or using the tube under protest or because someone else uses it. It is better not used than badly or carelessly used. Drainage and the conditions that require it must always remain a disputed question, but one fact alone must forever keep its opponents on the defensive, and that is that those who advocate it most have had the most experience with it, and that their cases so treated run a most uneventful course, even in most serious antecedent conditions. One point negativing its advantages in some cases urgently needing it is the semi-delirious condition of the patient during the first few days immediately following operation. These patients are unruly and their unrest will disturb the position of the tube and render it at once irritating and useless. I have two patients in mind in whom I believe the tube on this account would have been a serious disadvantage. In another in whom I considered it advisable, I removed it once when it had become displaced. I shall never forget the anxiety with which I watched over this patient through several days, fearing the oncoming of peritonitis and dreading the necessity of reopening the abdomen.

But if the proper use of the drainage-tube is essential to success, it is to be remembered that crevices created by desultory breaking up of adhesions at the bottom of the pelvis, having no common outlet by which they may drain, are beyond the reach of a single tube; hence, in appendicitis, for example, the careful placing of an additional rubber tube often gives security when otherwise at the best the end would be doubtful. A case of my own is here vividly before me and brings out the theory justified by results.

When it is sought to break up adhesions on either side of the pelvis because one side seemingly presents less difficulty than the other, the more difficult should not be abandoned when once begun, unless it is plainly evident that by freeing the simpler side a vantage-point is gained from which to attack the other. Going from side to side but gives two difficulties where but one before existed, and in event of prolonged operation, when completion for the patient's sake must be abandoned or postponed, adds additional complication and takes away

some of the chances of recovery. Such methods are common to inexperienced workers, and must be abandoned if good results are desired.

Incomplete operations are at the bottom of much of the criticism made as to the uselessness of abdominal or pelvic surgery. When an operator removes but one ovary and tube for hemorrhage of a fibroid he confesses to the knowing critic his incompetency to deal with the conditions he meets. He is as likely to cure such hemorrhage by such surgery as to raise chickens from china eggs.

By this it becomes manifest that a lack of resources is fatal to ideal surgery. The surgeon who deserves the name is a man of emergencies. The surgeon in masquerade, like the journeyman actor, tears, not his passion but his patient to tatters. By every operation so done a certain number of women whom surgery might save are frightened and so hindered from receiving the benefits of real surgery.

The easier operations are the bane of the would-be surgeon. Succeeding in one of these, he imagines he has conquered the whole field and at once rests easy in his assurance. To such men, and their patients generally, absolute failure in their first attempts is a distinct gain, for it frightens them away from the possibility of doing further harm.

Many other points leading to and illustrating the same idea, and showing conclusively where mal-operation and needless operation is most likely to occur, and why, could be multiplied. But this is not necessary. It is plain that that operator only is safe who has first learned by a long and painstaking apprenticeship, thoroughly and patiently, the principles of the work he is to perform; who, grounding himself in the principles, has applied them at the side of capable instructors; who, when he operates, does so for the patient's good and not for his own glory. Such a man—such men—must both give their patients their best hope and be the saviors of surgery from its false exponents, who only disgrace it.

The men who get the best results are those who work along safe lines, departing from them as necessity compels according to the exigencies of each individual case; not those who from the threading of a needle to the cleansing of a tube or the washing of their hands strive to be original. Such originality hides real surgery in a multiplicity of details and paraphernalia, and risks the sufferer to exalt the operator.

DISCUSSION.

DR. M. PRICE: I am fully in accord with the belief that most of our deaths can be accounted for by some want of care on the part of the operator before, during, or after operation. I recall two cases in which the previous care before operation had everything to do with the result. In one, the woman was sent into the house to be operated on. The patient declared that the bowels had been freely moved fifteen or sixteen times on that day. The operation was done, and it was found that the patient had not had the bowels opened for two weeks. She had an impermeable stricture, which would permit the passage of nothing but the watery contents of the bowel. The fatal result might have been avoided if the patient had been under the care of a trained nurse before the operation. I have seen this accident twice.

Many men who profess to be abdominal surgeons will go to a case of supposed tumor, or some other condition, prepared to do only that operation. They go to do an ovariotomy and a hysterectomy is required. The result is a death. The surgeon must carry with him everything that can be needed. I have seen many hundreds of abdominal sections, and have seen about as many mistakes as most men, and that, too, in the most competent hands.

As to the success of abdominal surgery. Does anyone pretend to say that when a surgeon amputates a leg, giving the patient a useful stump, that is not a success? I hold that it is. If we had subjected an abdominal case to such a risk of life, and had left it in such a crippled condition, what a howl there would be on the part of the medical profession! You take a woman who has been lying around, unable to assist herself in the slightest, and you remove the disease and allow her to move around with some little pain, some little crippling of her gait. You cannot expect to make a perfect cure. Many of the objections, and many of what are called sequelæ, are the fault, not of the surgeon, but of the patient's delay.

DR. G. BETTON MASSEY: My estimate of the paper that has been read by Dr. Hoffman is that it is an apology for abdominal surgery, and I think that from some points of view this branch of surgical work needs an apology. As to the causes of the bad results alluded to, there seems to be a divergence of opinion; by some we are told that they are due to improper operators, and by others they are attributed to the diseases and delay. I have been much impressed with the complaint made by Dr. Hoffman that there is too much persuading of patients to be operated on by the surgeon. When is it necessary to persuade patients to be operated on in other departments of surgery? This is the keynote of the paper. I have seen a number of patients who fortunately failed to take advice of this kind and are now well. A recent instance is that of a lady from a neighboring city, who had been persuaded to have the ovaries removed in order that the cervix might be repaired! Coming under my care some three or four days before the time set for this dangerous and unwarranted experiment, I found an enlarged uterus, with a hyperplastic nodule in its wall, that has readily been reduced by proper treatment. Nothing but an imagination stimulated by an excessive operative zeal could find disease in either the cervix or the ovaries.

Bad results in cases that are otherwise incurable require no excuse. Personally, I had rather die on the table under such circumstances than reject an only chance.

DR. O. H. ALLIS: It seems to me that a good deal depends upon who gives the advice whether an operation should be done or not. A patient comes with sarcoma of the jaw, where nothing but removal of the entire jaw, or at least half, will save life. Although the surgeon urges operation with earnestness, the patient goes away and nothing is done. The delay is fatal. The same is true in strangulated hernia. The patient should be urged to undergo immediate operation.

DR. WILLIAM E. ASHTON: The question of hernia following abdominal section is one of great importance. The surgeon who says that he never has a hernia does not follow up his cases. The majority of hernias are due to a failure in properly uniting the sheath of the rectus. I do not believe that fat women are especially liable to this accident. The integrity of the abdominal wall depends entirely upon the sheath of the rectus muscle, and this should be sutured in all cases. I believe, also, that a large number of hernias are due to getting out of bed too soon. The patient should not get up under three weeks. There is not much benefit in an abdominal support. I have found it impossible to keep any bandage closely enough applied to relieve the ordinary strain. If the patient is doing heavy work, an abdominal support may be of service.

In regard to fistula caused by a ligature, I might mention a clever device told to me by a doctor from Texas. He takes a number of horsehairs, doubles them over upon themselves and ties them together, and passes them into the fistula and turns them around. In this way he often succeeds in bringing away the ligature.

I believe it to be a good plan to have the patient in a hospital, if possible, in order that she may be under observation and control. I do not believe that there is more danger of sepsis in cases operated on at home than in those in hospitals. Sepsis does not come from the atmosphere. Barring the question of control, there is little difference, so far as results are concerned, where we operate.

DR. J. PRICE: Dr. Allis has given an interesting point in reference to the selection of cases and the importance of promptitude. The whole experience of abdominal surgeons is in favor of promptitude in pelvic abscess and in small tumors of all kinds. I may say in regard to mortality that if my mortality equalled the number of cases that I find dead when I arrive at the house I should cease to operate. A man to do abdominal surgery should serve an apprenticeship, not only that he may know how to recognize, but that he may, with specimens in hand, compare them with the histories. With a pair of pus tubes or an ovarian abscess you can almost demonstrate the number of attacks of pelvic peritonitis from which the woman has suffered.

It is all very nice to talk about the sequelæ of abdominal sections, but the sequelæ antedate the operation in many cases. I saw to-day a large cystoma probably complicated with fibroid. The patient had been counselled by many not to have the tumor removed. I sometimes wish that the general practitioner and general surgeon were like the eye and ear men—they attend

to their business, and cease to criticise the abdominal surgeon's work. The imperfect work of the dabbler or pseudo-gynecologist is not to be considered.

DR. J. M. BALDY: Unquestionably many of the so-called sequelæ occur before the section has been performed. Many, also, are due to incomplete operations. I do not think that any one cause is at fault. I have not found that fistula and hernia are more apt to occur in fat women, nor have I found that suturing of the fascia will prevent it.

In regard to hospitals, I believe in railroading patients into hospitals, if you have well-appointed ones. You have there a better chance to do good work and to watch the patient. Some of my best work, however, has been "alley work," but it has been most anxious work. In these cases I have been forced to permit them to get up in two weeks. In hospitals you can keep the patient in bed. I think that four weeks is not too long.

As to the cause of death, I have seen one death from shock in the hands of another gentleman. I have seen one or two deaths from hemorrhage, but the one great cause of death is septic peritonitis. In some of these cases I have thought that the tube was at fault, but in others there was no drainage. In regard to early operation, if it is an operative case, the operation cannot be done too soon.

DR. CHARLES P. NOBLE: In regard to the cause of death after abdominal section, I may say that in my own experience the deaths, with two exceptions, were due to the fact that the patient was operated on when she was almost dead from disease. I have had three deaths from kidney trouble. In two the condition was not discovered prior to operation. Sérious kidney disease is a positive contra-indication to abdominal section involving any considerable manipulation.

I think that our facilities for managing patients are much better in hospitals than at home, and I think that there is every inducement, both on account of the patient and ourselves, to urge her to go to a hospital.

In reference to cellulitis. Most men who do abdominal surgery say that they never see cellulitis. I have seen it but do not think that it is a common condition. I do not believe that we meet with it as a non-puerperal condition. Cellulitis in the pelvis occurs as does cellulitis in other parts of the body—from infection. I have knowledge of four abdominal operations in which the tubes were examined and found free from pus accumulations. Of course it was not possible to say that catarrhal salpingitis was not present. Large quantities of pus, however, were evacuated through an incision over the ramus of the pubes. They were undoubted cases of pelvic abscess. I believe that this accounts for the fact that certain women recover and bear children after they have had pelvic inflammation complicating labor.

In regard to drainage, it has become my practice to drain in almost every case, and I have seen no reason to regret it. Unless there is a special reason to the contrary, I drain every case. It is often said that unless the tube is cleaned every half-hour to two hours the surgeon does not understand drainage. At the Kensington Hospital for Women there has been a series of as many as sixty cases, with one death, where this principle of drainage was not used. In the last thirty-three cases (without a death) the drainage-tube was not evacuated oftener than three times in twenty-four hours. My expe-

rience with the capillary drain, running over one hundred cases, enables me to say that it is a most efficient form of drainage, and that it is the exception, even in bad cases, to find more than a drachm of fluid in the pelvis when the tube is drained. By this measure the pelvis is continually drained.

DR. HOFFMAN: It is surprising how statements can be made apparently at variance with one another and still be at the bottom identical. I maintain that a tube that is cleaned or emptied once every eight or twelve hours is of no earthly use, and had better be left out. Dr. Noble gives such direction, and yet uses capillary drainage which is constant, thereby attempting by another means what we do, as we believe, still more effectively by the syringe. The capillary tube will not remove such small débris and clotted matter which often tends to block up the bottom of the tube, and in this respect is inferior to the syringe, and not so easily managed.

My argument in reference to hospitals is that they are not a *sine qua non* for operation, that the very best results are gotten outside of them, and that when a good nurse is at hand, and a room obtainable, the patient is in an atmosphere far preferable to that afforded by hospitals generally, and some special ones with which we are acquainted. Patients that cannot be controlled out of a hospital, cannot be controlled in it. Accidents are never heard of in our private cases. On the other hand, where is it that we hear of nurses careless and inefficient, and of patients unruly and escaping from their beds, leaping out of windows, getting into the street, but from presumably well-watched private or public hospitals.

In discussing the question of advice as to operations, I did not intend to leave the impression that we should not advise our patients. That is our duty. What I did mean is that after having given our opinion, we have no business to gain assent to operation by ultra statements, or by promises of absolute health or of children if a perineum or cervix is concerned. Neither have operators in their pruriency a right to visit patients to beg such operations. In no other field than in gynecology are such procedures heard of. If an operation is necessary we should say so, and tell why it is. If the patient does not accept it, the result does not lie at our door.

THE PNEUMO-THERAPEUTIC INSTITUTE OF BRUSSELS.

By DR. HOVENT,
BRUSSELS.

[Read by Dr. A. A. Eshner, June 10, 1891.]

Last summer I received a visit from Dr. S. Solis-Cohen, with whom I had already been corresponding on the subject of pneumo-therapy. I was gratified by his expressions of astonishment on inspecting the Pneumo-therapeutic Institute. I also felt a pride in being able to teach something to a confrère from the country whence progress in every science comes to us.

At the request of my guest of some hours, I shall endeavor to describe the establishment with which I am connected, briefly relate its history, and indicate the physiological and therapeutic actions of air-baths.

In 1879, a number of prominent Belgians who had undergone successful aëro-therapeutic treatment at Contrexéville, a French spa, determined to establish an institution for a like purpose at Brussels, and accordingly invited Dr. Yamin Despalles, under whose care they had recovered, and who was already well known through his works on neurology and aëro-therapy, to come and create in Brussels an establishment in which all the improvements in his favorite treatment should be found. The invitation was accepted and a limited society was at once organized. The founder, however, did not long live to see the fruition of his work, and was succeeded in turn by a lecturer at the University, an academician among others, and finally by myself.

The Pneumo-therapeutic Institute of Brussels is the largest and most complete in the world; it is situated in one of the healthiest parts of the city, near a small park. As first constructed, it was intended to practise oxy-therapy, azo-therapy, aëro-therapy, including compressed or rarefied air-baths, and also anæsthesia by the method of Paul Bert; afterwards, this last method and the azo-therapy were

given up and numerous improvements were successively introduced, so that now the establishment furnishes the following services:

1. Baths of compressed or rarefied air, with or without supersaturation of oxygen gas.

2. Inhalations of compressed air with expirations into rarefied air.

3. The sale of oxygen gas in the city, the country, and even abroad.

4. Electro-therapy, by static and dynamic machines.

I have nothing to say upon these three last points. The works of S. Solis-Cohen have elucidated the treatment by pneumatic differentiation better, if with less prolixity, than any author of our continent. To make the establishment complete, it is furnished with the apparatus of Maurice Dupont, Geigel and Mayr, Hovent, Schnitzler, Solis-Cohen, Tobold, and Waldenburg. I use these apparatus, however, only upon request by my confrères, because I have personally ascertained that, while they are of real value, yet, as compared with the air-baths, their utility in several directions is very questionable. In this connection a recent paper by my friend, Dr. Arntzenius, of Amsterdam (*Geneeskundige Courant*, 29 Juni, 1890), is of interest.

Oxy-therapy and electro-therapy are methods of treatment better known and more widely practised in the United States than in Europe. I will, therefore, not consider them.

I now come to the subject which is really interesting to my American colleagues—baths of compressed or rarefied air. These are given by means of seven iron chambers of varying capacity, some being capable of comfortably containing from two to ten persons. Each chamber is very well constructed; it is supplied with several windows of glass two centimetres (three-quarters inch) thick; it has a duplicated door, or perhaps better expressed, two doors enclosing a lobby, in which the doctor, entering by the outer door, can shut himself, and then equalizing the pressure, can open the inner door and speedily reach the patient for any purpose without great alteration of the pressure in the chamber. Another smaller door, also duplicated, serves for the purpose of handing to the patient books or whatever may be desired. Electric bell, elbow-chairs, toilet-tables, manometer, thermometer, hygrometer, etc., are all at hand.

From the chamber so described emerge six pipes leading to the underground tanks of 1, compressed; 2, rarefied air; 3, nitrogen; 4, oxygen gas; the last two pipes are for the purpose of purifying the air, of which I shall soon speak. Each of the first four pipes is

attached to a little tank which permits of the measurement of the quantity of air, nitrogen or oxygen, introduced into the chamber, or the quantity of air removed.

The large tanks in which the air or gas is compressed, or rarefied, are ten in number. Each holds several thousands of litres. The compression or the rarefaction of air or gas is obtained by means of a gas engine of eight-horse power. The tanks will bear seven or more atmospheres of pressure, or a corresponding degree of rarefaction.

The manipulations are as follows: If it is desired to place the patient in a chamber, and the pipe connecting the chamber with the tank of compressed air, for instance, is opened, this compressed air rushes in; its quantity can be regulated according to circumstances. The reverse takes place if rarefied air is to be used; the air of the chamber rushes out and the patient remains in a relative vacuum.

One serious and even capital drawback to the employment of air-baths lies in the fact that in the course of the two hours, the duration of an ordinary sitting, the air within the cabinet soon becomes foul. from the processes of respiration, perspiration, etc. The establishment at Brussels is the only one in which this inconvenience is efficaciously overcome. The air is being constantly withdrawn from the occupied chamber, and purified by being passed through several iron Wolff's jars with chemicals, to be again introduced, the same degree of positive or negative pressure being always maintained.

It may be desirable to impregnate the atmosphere of the chambers with the vapor of certain medicinal agents; it is an easy matter to place the substance to be used in the path of the air current, or more simply to put some drops of an essence on boiling water into the chambers. I frequently and successfully use pumiline essence.

This is, in brief, all that I think necessary to give a fair idea of the application of the air-baths. I shall now consider their physiological and therapeutic action.

To treat this subject at length as it deserves would require too much space; therefore I shall confine myself to an epitome which, I hope, will serve as an index for the reader. In English medical literature I know only of the papers of the eminent C. Theo. Williams (on air-baths; I shall say nothing of pneumatic differentiation). This is in striking and unaccountable contrast with the profuse medical literature of the continent. I shall quote from some of our authors, but chiefly from my personal experience.

The compressed air-bath more completely expands the pulmonary vesicles and increases their elasticity; the diaphragm and the base of

the lungs descend lower; the respiratory process is more perfectly and less frequently performed; the peripheral circulation is less active, with some degree of decongestion of the skin and the mucous membranes (nasal, laryngeal, pulmonary, etc.); the pulse is less frequent and more full; the appetite and strength increase rapidly; the nervous system is undoubtedly invigorated. One may observe that these effects are corollaries of one another and result either from mechanical or chemical action; indeed, the oxygen of compressed air is no longer oxygen, but some form of ozone.

The rarefied air-bath has not been so well studied; nevertheless, it is employed with much success by some practitioners, who seek in it a reproduction of mountain atmosphere. It has also been recommended for rickety children, when the thorax is deformed. Recently it has been used alternately with the compressed air-bath, when a doubt exists as to whether a patient should be sent to the mountains or to the seashore. The therapeutic uses of the air-baths are very numerous, but easily deduced from the foregoing considerations.

Asthma is the principal affection for which compressed air-baths are employed. 80 per cent. of recoveries are obtained after twenty to sixty sittings. During the first sitting the dyspnœa disappears when the pressure of air is sufficient; this result becomes permanent only after a number of sittings. I remember but one case, that of an American patient coming from Oregon, in which the paroxysms reappeared as soon as the pressure was lowered. The patient was very well while under pressure, and I have frequently kept him enclosed for eight or ten hours instead of two. I diagnosticated a traumatic medullary lesion, limited to the respiratory centre.

In pulmonary emphysema, the air-bath empties the vesicles and increases their elasticity, so that the dyspnœa diminishes. The first sitting is usually followed by a notable improvement. As in asthma, the success is generally striking and permanent. Pulmonary congestions, pulmonic processes preceding or following pneumonia and hæmoptysis, are cured mechanically, since the compressed air provokes anæmia of the pulmonary tissues. I have some absolutely confirmatory observations. Chronic bronchitis and bronchorrhœa are always improved, so far as concerns dyspnœa, cough, expectoration, and general health. The first effects of the treatment are an increased expectoration up to the point of completely ridding the lungs of mucus, and simultaneously a decongestion of the respiratory mucous membranes. The last action must be invoked in explaining the beneficial influence of compressed air in coryza, chronic pharyngitis and

laryngitis, and in that exaggerated susceptibility of the mucous membranes, as a result of which the patient is constantly exposed to the danger of catching cold. I have recorded two cases of chronic amygdalitis, in which resection had been contemplated, and in which I obtained complete cures by compressed air-baths.

In whooping-cough, "the beneficial action of air-baths is undeniable," said Dujardin-Beaumetz. The cure is obtained after ten to fifteen sittings; and generally the child gains from one to three pounds in weight.

Jaccoud charges with gross neglect the physician who does not submit his consumptive patient to aëro-therapy. Oertel thinks the compressed-air treatment far superior to climatic treatment in any country. Prof. Bertin (Montpellier) has recorded five cases of recovery in consumptives in the third stage.

Heart disease had long been considered the only drawback to aërotherapy, but since I have successfully treated a number of cases with cardiac complications, I no longer hesitate to treat such cases, only using certain precautions.

In catarrhal deafness compressed air effects a natural catheterism. I have not infrequently seen patients suffering with asthma or other complaints emerge from the chamber declaring that their hearing was better than for many years.

Dujardin-Beaumetz says: "Compressed air-baths are to be preferred to any other method of treating chlorosis, anæmia, diabetes, albuminuria, and gout."

Obesity, also, is favorably influenced as a result of the acceleration of organic combustion and the more active elimination of urea and carbonic acid.

In conclusion, I must add that Dr. Arntzenius has cured some cases of neurasthenia, and that I have recorded three observations of dysmenorrhœa being permanently cured by a pneumo-therapeutic course. I think these results are due to the general invigorating power of the treatment.

If I should quote all the authors who have written upon the subject of air-baths, not only in France, where the treatment was originated, but in Russia, Scandinavia, Holland, Germany, Italy, and Spain, the list would be a very long one. I wish only to note that none of them has expressed an unfavorable opinion. I am convinced that the treatment which I have expounded is entirely reliable, and I shall be happy if my paper contributes to make the medical profession of the United States acquainted with the better method of pneumo-therapy.

DISCUSSION.

DR. THOMAS J. MAYS: I am a firm believer in the efficacy of compressed and rarefied air in all kinds of chest diseases as well as in general diseases of the body. My experience has been limited to the use of these agents with the Waldenburg and Cohen-Richardson apparatus. These apparatus are of value in many forms of lung disease, especially in incipient phthisis, bronchitis, and in asthma. You cannot use rarefied and compressed air indiscriminately. Rarefied air is suited for some conditions, and compressed air for others. I think also that in certain forms of incipient phthisis compressed air will tend to aggravate the disease. If the temperature is above 100° its use will tend to increase it. I have given up the use of compressed air alone, and now employ oxygen and nitrous oxide under pressure, either with or without air.

In Berlin I saw cabinets similar to those described in the paper. They certainly do a great deal of good, but strange to say, most of the writers speak of the value of compressed air without saying much of the value of rarefied air. I think that by immersing a patient in rarefied air you obtain the same effects as you would by placing him at a high altitude. I do not think that the good comes so much from the effect upon the lung as from the influence which is exerted upon the whole body. By taking off part of the pressure from the surface the resistance to the circulation is diminished, and in that way the blood is permitted to reach the periphery and nutrition of the outlying parts is stimulated. I think that in this lies the great and chief value of mountain air in the treatment of consumption.

The influence of compressed air upon hearing has been referred to. It has been found in the cabinets at Berlin that the compressed air increased the sense of hearing of everyone, but, so far as I know, this is only temporary. Those who were hard of hearing will improve for a time, but soon the hearing is as bad as before.

DR. S. SOLIS-COHEN: Except from reading, I know very little about this particular branch of pneumo-therapeutics, my experience being confined to the method by which the patient inhales from or exhales into compressed or rarefied air. The method of immersing the patient in an atmosphere of modified pressure requires expensive apparatus, but from what I saw in Brussels, and from the examination of patients with a comparison of their previous histories, I believe that the method accomplishes all that Dr. Hovent claims for it. I went into the cabinet myself, but did not remain long; the noise in the ears and the sense of fulness in the head were sufficiently unpleasant to make one wish to get out as soon as possible. All who have used this method, with the exception of Waldenburg, claim that it is superior to the differential method, though they admit the greater availability of the latter. I have had no opportunity of comparing the two methods, but my experience with the differential method has been thoroughly satisfactory. The remark of Jaccoud, quoted by Dr. Hovent, will well bear repetition; I would, perhaps, slightly modify it and say that "Whoever fails in a suitable case of phthisis to give his patient the benefit of a trial at least of aëro-therapy, fails to do his duty."

I do most sincerely believe that the routine writing of prescriptions, with a neglect of the mechanical means so far superior in many cases, is a failure on the part of the medical profession to do its duty toward those whose lives are, humanly speaking, entrusted into its hands. My personal experience now extends over ten years, and I should not like any patient of mine to be deprived of the opportunity of a trial. Inhalation of compressed air will not work miracles. It will not revive the dead. But it will help the patient to fight the disease. It dilates the air-cells, improves the quality and distribution of the blood, and gets rid of accumulated decomposing products which may give rise to septic fever.

DR. JAMES C. WILSON: Is it not the experience of patients that after a time these unpleasant sensations, due to disturbance of circulation, diminish?

Dr. Cohen has more right than anyone else to arraign the profession for the neglect of these mechanical measures, for he has been a pioneer in this country, and a consistent practitioner in this particular branch of therapeutics. But I am at a loss to understand what view a man occupying Dr. Cohen's position can take of the decadence of the enthusiasm which followed the invention of the pneumatic cabinet, four or five years ago. There was a most excellent device for the practice of such methods as Dr. Cohen advocates. Many who at first claimed excellent results from the apparatus have abandoned its use.

DR. LAWRENCE F. FLICK: I have no personal experience with this mode of treatment. I, however, believe with Dr. Mays that compressed air may do considerable harm in a certain class of cases. I have seen some things in practice which tend to confirm that view. Where the disease is in an acute stage the quieter the circulation the better for the patient. I have seen a case where even a little exertion more than was prudent precipitated a general tuberculosis where the disease had been simply local. I believe that the application of compressed air would be of benefit in cases in which the acute stage is passed, and there is considerable material to be gotten rid of.

It seems to me it is hardly fair to arraign the profession for neglecting the use of this method of treatment. It is scarcely right to deal in a general way with this subject without giving detailed accounts of the benefits of the treatment. If such wonderful results are obtained, we should be shown them.

DR. SOLIS-COHEN: In reply to Dr. Wilson, there is no question that tolerance to the effects of immersion in compressed air is gradually established, just as tolerance to the effects of altitude is established.

Allusion has been made to the absence of reports of the effects of rarefied air-baths. These have been tried, but abandoned. Paradoxical as it may seem, it is the compressed air-bath and not the rarefied air-bath that simulates the therapeutic effects of mountain residence. The complaint of Dr. Flick is not well founded. These methods have been in use since 1838, and numerous cases are on record. I have reported a few, but not many, because at this late day it is superfluous.

In reference to the pneumatic cabinet, the methods employed in exploiting it were a sufficient reason why it should not find favor with the bulk of the profession. Then, again, it is a very troublesome and expensive means of doing what can be done much more cheaply and simply. Many physicians of high repute, however, still use it. Among others I may cite V. Y. Bow-

ditch, of Boston. We may rest assured that no physician who has used pneumatic treatment will ever abandon it. The question of apparatus is secondary. The pneumatic cabinet has the same disadvantage that belongs to the pneumatic chamber, and that is, that the patient is compelled to visit the physician to obtain the benefit of the treatment. With portable apparatus, which can be placed in the patient's home, this objection is overcome. If I take any credit to myself it is for simplifying and cheapening the machinery so as to make this possible. As a matter of course, pneumatic measures have their indications and counter-indications, as atropine, morphine, bromides, and drugs in general have theirs. No one uses atropine to produce bromide effects. Air has its definite field of use, just as atropine and bromide have theirs.

Nobody uses compressed air in acute tuberculosis. This was long ago laid down as a counter-indication by Waldenburg and others. It is not to be used in certain diseases of the heart, or in cases with large cavities with extensive septic processes. Between cases with acute processes and the stage of extensive excavation, as well as in the very early stages of so-called incipient phthisis, lies an extensive field for the employment of mechanical measures. They are used not as exclusive measures or panaceas, but to produce certain definite and highly desirable effects that cannot be produced by any other agent; certainly not by drugs, whether creasote or iodoform, hypophosphites or cod-liver oil, tuberculin or cantharides. Especially with patients who would be benefited by mountain climate, but who cannot get away from home, will pneumatic treatment prove a valuable substitute. Some patients have even taken their machines to the mountains, because they dreaded to be deprived of the good effects. I repeat that the treatment works no miracle, but every patient has a right to the additional chance for life it may give him, and the physician who deprives him of that right is at least negligent. We will never save all the phthisis cases that can be saved until we get rid of the idea that "specific medication" is a possibility, and concentrate our attention on improving the patient's general and local vigor and nutrition.

DR. MAYS: I think that the principal reason why the pneumatic cabinet has fallen into disuse is because it cannot be used in private offices. In hospitals it can be used and is used.

In regard to the use of compressed air I would say that I made no reference to acute diseases when I cautioned against its indiscriminate employment; but thought of subacute or chronic pulmonary affections. I have in mind now a case of catarrhal phthisis of about eighteen months' standing, which I am quite sure became aggravated after the third inhalation of compressed air. She became worse in every respect, and died about two months later. I have knowledge of other cases who were served somewhat in the same way, and I seriously think that great care should be exercised until we know its influence on each case.

I certainly think that Dr. Cohen must be mistaken when he says that the effects of compressed air are the same as those of the rarefied air of mountains. Not to my recollection have I known anyone else express this view.

[On motion, the thanks of the Society were extended to Dr. Hovent for his interesting paper.]

ABORTION AT FIVE WEEKS, WITH SUBSEQUENT EXAMINATION OF THE EMBRYO.

By T. RIDGWAY BARKER, M.D.

[Read June 10, 1891.]

The following case is reported, not on account of the infrequency of abortion at such an early period of gestation, but rather with the hope that a full and detailed account, accompanied with a thorough examination of the embryo, which one is rarely successful in securing, may prove of interest to those devoting their time and attention to a heretofore much-neglected subject:

Mrs. S., aged twenty years, married, no children, gives the following history: Menstruation began at the age of thirteen years; she had always been regular in her menses, though at times the flow had been profuse, and accompanied by considerable pain. Her general health is good; there exists no kidney trouble nor specific taint of any kind. She last menstruated on November 6, 1890, duration five days, the discharge being normal in every respect, save that it was accompanied with some abdominal pain. On the arrival of her next period to menstruate, December 4th, there was no flow, nor any symptoms indicative of its approach. The patient was gratified by this state of affairs, as she believed herself pregnant. Week succeeded week without any appearance of her sickness, and hope continued to grow in her breast.

On the 26th of December I was called to see Mrs. S., whom I found very anxious and alarmed about her condition, as she had passed, she told me, a small clot of blood, and declared she felt as if her sickness was about to return, though it was not at a menstrual period. On questioning her further, I was unable to discover any symptoms of pain, and therefore merely advised her to keep quiet and avoid exercise of an exhaustive nature, as I feared should she fail to heed my words of caution that she might suffer from an abortion, it being my opinion, on examination of the vulva and mammæ, that she was some five weeks pregnant. While, of course, it was impossible to make a positive diagnosis at this early stage of gestation, still from the globular form of the breasts, the prominence of the nipples, and the dimpling at their summits, in addition to the purplish hue of the vagina, I considered such a supposition justifiable. As my patient was a blonde, the areolæ were faint, and could not, therefore, be regarded as of much importance. Nor

were there sufficient gastric or nervous symptoms present to warrant me in expressing a more positive opinion.

On the following day I called to see Mrs. S., whom I found suffering great pain, which had come on during the night, and was paroxysmal in character, and referable to the back and hypogastrium. Her distress was of such an aggravated form that it was necessary to afford relief as promptly as possible by giving a hypodermic of sulphate of morphine. I learned on inquiry that during the night she passed several clots of blood, and that the flow had been so free that she was obliged to have frequent recourse to a change of napkins. The pulse, at the time of my morning visit, was quick and weak, and the temperature considerably above the normal. I determined, therefore, to explore the vaginal canal, and at the same time examine digitally as to the condition of the uterus. The cervix was discovered by the finger to be softened and the os slightly patulous, while the body of the uterus was enlarged and tender. Continuing my examination I felt several clots in the posterior fornix of the vagina; these I removed, which, on escaping into the palm of my hand, were found, in part, to consist of coagulated blood, but, in addition, an ovum with its membranes intact. This was placed carefully aside until my patient had been rendered more comfortable.

The treatment was generally symptomatic, consisting of anodynes and antipyretics, which seemed all that was required, as the hemorrhage was slight, and not likely to increase, but rather diminish, since the uterus had expelled its contents. My attention was now directed to an examination of the product of conception. The ovum, to the naked eye, had the appearance of a pale-yellow vesicle, save where the crimson shaggy villus processes projected from the chorionic membrane. The whole mass measured six-tenths of an inch in diameter, while the length of the villi averaged only one-tenth. At the point where the outer portion of the chorion had been torn off from the ovum (indicating the place of separation of the ovum from the decidua), the membranes were so thin and transparent that the eye could clearly discern through them the diminutive embryo, but one-fifth of an inch in length, surrounded by its amnion, which closely invested it. From its caudal extremity could be seen the allantoic stalk extending out to the periphery of the ovum where it fused with the subzonal membrane. The direction which this vascular outgrowth was observed to take was, first, at right angles to the long axis of the embryo until it passed beyond its inferior extremity, when it made an abrupt turn and changed its course so as to run parallel to that same longitudinal axis. Two vessels of a crimson color were visible, but they could not be traced to the periphery, though very distinct for more than half the length of the allantoic stalk. That portion of the ovum from which the chorionic layer with its villi had been torn off was directly at the point where the duct of the allantois joined the outer ovular membranes. In other words, the outer layer of the chorion with its villi had been separated from the ovum at what one may reasonably suppose was destined to be the placental site. Hence one is justified in concluding that the villi in this locality were larger and more deeply imbedded in the placental decidua (decidua serotina) than at any other point. Further, that the ovum was lost, not on account of any morbid state of the uterine mucous membrane, but through traumatism, the source being unaccounted for and unknown. The villi appeared perfectly

normal, and were of a bright crimson color. As regards their structure and development, there was nothing suggestive of any pathological change having occurred. By means of a keen, delicate instrument it was possible to dissect the membranes entering into the formation of the chorion, and expose three layers to view.

The external, from which the villi were outgrowths, being the opaque altered vitelline membrane; the middle, thin and transparent, I judged to be the remains of the zona pellucida and false amnion (subzonal membrane), while the third, and internal, similar to the middle coat, represented the membranous portion of the allantois. Of these three separable membranes making up the chorion, the external alone was opaque. The ovum was slightly heavier than water, yet did not sink to the bottom of the phial in which it was placed, the villi seeming to buoy it up. Beneath the chorion and enclosed by it was a space filled with some thirty minims of a clear, highly refractive fluid, almost colorless, separating the chorionic walls from that of the amnion.

This fluid was of a neutral reaction. Cutting through the layers of the chorion, the fluid was permitted to escape, but did so very slowly, as there existed delicate bands of fibres extending from the amnion to the chorion. These fibres did not cross each other, but radiated from the diminutive amnion, like the spokes of a wheel. It became necessary to divide these before the embryo with its membrane (amnion) could be liberated. The allantoic attachment was not, however, disturbed, that the relation of the parts might not be destroyed. Having freed the amnion, it became advisable to extend the examination so as to include the embryo and its appendages.

The umbilical vesicle had undergone atrophy, and was apparently quite empty. It inclined toward the abdomen of the embryo, and was scarcely as large as its neighbor. It was pear-shaped, and resembled a balloon that had almost collapsed. No vessels of any kind were visible in or upon its walls, which were corrugated and shrunken.

Proceeding next to a microscopic examination of the embryo by means of low and high power objectives the following structures were studied: The embryo occupied a position at the centre of the ovum, where it remained almost stationary, being held in place partly by the amnion and its chorionic fibres, and partly by the allantois. It was a yellowish-white, opaque, gelatinous mass of matter, soft and friable.

The outer covering consisted of round nucleated embryonic cells closely packed together. The long diameter of the embryo, corresponding to the vertebral axis, was one-fifth of an inch in length, while its transverse diameter was not more than one-fourth as great. No eyes were visible, though diligently sought for, nor was it possible to discover even rudimentary upper or lower extremities. The caudal portion of the embryo was very distinct, and being slightly transparent one could see without difficulty the segments of the notochord and the embryonic vertebral arches in their process of development through the outer covering. The abdominal walls were still separated, and hence there existed a direct means of communication between the umbilical vesicle and the visceral cavity. The cephalic extremity of the embryo presented nothing peculiar nor characteristic, being simply a rounded mass of matter, similar in appearance to that making up the body walls. The line

of demarcation between the head and the trunk was but a constricted portion, which represented the neck. No bronchial arches were made out, nor the presence of any oral cleft. Examination of the deeper structures was rendered impossible by the rapid disintegration of the tissues.

As regards the patient, after a week's rest in bed, necessitated by the nervous prostration incident to the sympathetic disturbance, she regained perfectly her health and strength, and there remained no uterine or other unpleasant sequelæ.

In this report of my examination of a five weeks embryo and its coverings I am well aware that there are statements quite at variance with those recorded by several authors, among whom may be mentioned Hirst, in his *System of Obstetrics*, vol. i., wherein is stated, page 129: "In the human embryo the period during which the umbilical vesicle increases in size ends at about the sixth week; then its rapid diminution commences." Yet, in my specimen, I found the vesicle almost empty, much atrophied, and its walls shrunken at five weeks gestation. Again, as to the number of coats comprising the chorion: by nearly all the authorities it is said to consist of but two—externally, the subzonal membrane; and internally, the allantois—through the diappearance of the vitelline membrane, zona pellucida, and internal lining membrane of the primitive ovum. Yet, when I began the dissection of these chorionic layers, I found it possible to separate *three* distinct membranes as described above. The villi were further noticed to be outgrowths from the external layer, not being imbedded in any way in the underlying structures. As to the absence of eye-spots and rudimentary extremities I have no satisfactory explanation to offer. This lack of development may have been due to an insufficient supply of nourishment, or subsequent investigation may prove these structures to appear at a later stage of gestation.

ON THE ANTI-MALARIAL PROPERTIES OF PAMBOTANO (CALLIANDRA HOUSTONI).

By A. E. ROUSSEL, M.D.,

DEMONSTRATOR OF PHYSICAL DIAGNOSIS IN THE MEDICO-CHIRURGICAL COLLEGE; PHYSICIAN TO THE HOWARD HOSPITAL; TO THE SOUTHWESTERN HOSPITAL, ETC.

[Read June 10, 1891.]

I TAKE pleasure in bringing to your notice a drug which has recently been the subject of considerable experimentation as regards its anti-malarial properties, but which has not as yet been tested, so far as I know, in our own country.

The Pambotano, or Calliandra Houstoni (Baillon), is a small tree, growing from three to five feet high, and is found principally in Mexico, where it seems to have possessed considerable reputation for its medicinal qualities.

It was first prominently brought before the attention of the medical profession through an article of Dr. J. Valude, which was presented to the Académie of Médecine of Paris by Dr. Le Roy de Méricort, on the 19th of November, 1889, and which resulted in a report on the subject by the Académie on February 18, 1890.

In this report Dr. Dujardin-Beaumetz, although doubting the ability of this drug to replace quinine, admits of its apparent value, and suggests the necessity for further experiments in this direction. Dr. Villejean, in a chemical analysis of the plant, has as yet been unable to isolate its active principle, but notes the presence of a peculiar tannin, which yields a dark-green precipitate with the perchloride of iron, and thus closely resembles the tannin of catechu and cinchona.

Dr. Valude uses a decoction and alcoholic elixir in doses of 70 grammes for an adult, and 35 grammes for a child under twelve years of age. One litre of this solution should be divided into four doses, and taken within the twenty-four hours, each dose to be sweetened and drunk hot. His report comprises personal observations of fifteen

cases of malarial fever, besides a *résumé* of the results obtained in Mexico, Japan, and Italy. Of the fifteen cases in question seven were complicated by other diseases, such as la grippe, tuberculosis, grave anæmia, and in one case by intermittent dental neuralgia. In these last cases the periodical attacks were suppressed, while the results in the uncomplicated cases were uniformly successful, and in the majority of instances but one dose of pambotano was necessary to effect a cure.

The following observations are related in detail:

CASE I.—Girl of sixteen years, very anæmic; quotidian fever beginning May 17, 1886, at 2 o'clock, and becoming permanent with exacerbation the following day at 2 o'clock. Continual headache, which increases at time of access. Decoction of pambotano May 22d. Vomiting at the second dose. Nausea with first dose. Cephalalgia disappeared after first dose. Since that time the fever has not returned.

CASE II.—Child of twelve years; same type as above, with violent cephalalgia, which is worse at the beginning of fever, 4 or 5 o'clock in the evening. Decoction of pambotano the fourth day of the fever. Nausea and vomiting after first dose. At third dose child vomited food taken one hour before, but no medicine. Food taken twenty minutes after the last dose was followed neither by nausea nor vomiting. The bowels were opened after the first two doses. The headache disappeared after the first. At 4 o'clock the fever did not return. Two doses alone had been absorbed. The cure was definite.

CASE III.—Man of twenty-two years, suffering from intermittent fever contracted at Tonquin. Four different attacks while at Tonquin at two or three months interval (in September, December, February, April). Returned to France in May. Return of fever in July, tertian type. Decoction of pambotano the day of the attack. Some nausea, no vomiting. After the first dose the headache disappeared. The fever did not return. Fifteen months afterward the cure was maintained, and the fever which had previously returned every two months had not reappeared.

CASE IV.—Man of forty-four years. Subject to the tertian fever, two attacks of which have been treated by quinine. At the third attack decoction of pambotano. Some nausea. The fever has not returned.

CASE V.—Woman, forty-eight years of age; quotidian type, commencing at noon with a violent pain on the right side. The elixir, containing 50 grammes of the root, was given on the 30th of March. Some nausea. One passage after the first dose, which caused the disappearance of the pain above mentioned. At 1 o'clock the customary chill did not appear, but a slight elevation of temperature was noticed. On the 31st of March the fever returned to a slight extent. On the 2d of April no fever, but the appetite was poor and the tongue coated. After the 3d of April the fever no longer returned.

CASE VI.—Man, forty-six years of age. First attack. Suffering for eight days from well-marked attacks, with violent cephalalgia. Decoction of 70 grammes of pambotano. No bad results. At noon, the customary hour for the

chill, nothing was noticed, notwithstanding that only two doses had been taken.

The following cases have also been collected by Dr. Valude:

Dr. J. M. Bandera, of the University of Mexico, after carefully testing the drug in various hospitals, declares that he has obtained excellent results, even in cases which had not yielded to the use of quinine.

Professor J. D. Campuzano, of Tacubaya, as well as Dr. J. B. Lobato, report excellent results.

The government of Guanajuato appointed Drs. J. Hernandez, R. Lopez, and T. Dominguez to officially report on the merits of pambotano, and after careful experiments these gentlemen reported marked success.

Dr. Lafont reports having treated the Conseiller-general of French Guiana, who had suffered from a severe type of malarial fever for five years, which had resisted the use of quinine, arsenic, as well as a long sojourn at Vichy. One dose of pambotano was sufficient to effect a cure, maintained until the present time.

In the province of Salto, Argentine Republic, Drs. C. Cotas, J. Tedin, and A. Valdez have treated numerous cases of malarial fevers, some of which were uninfluenced by the administration of quinine, but all of which yielded to the use of pambotano.

Concerning the results obtained by its use in the French and the German hospitals at Yokohama, Japan, the Belgian minister reports that in all the cases a cure resulted within forty-eight hours.

Dr. A. de Cadilhac, an Italian physician, reports the cure of a case of obstinate malarial fever contracted in the neighborhood of Rome, which had resisted the use of strong doses of quinine.

Dr. Betances, now of Paris, reports three cases of severe malarial fever, contracted at Panama by employés of the Canal Company, which had totally resisted large doses of quinine and arsenic, as well as the douche treatment. In each case one dose of pambotano resulted in a permanent cure.

Dr. Depeton, practising in the Basses-Pyrénées, gives a history of three cases, with an equally successful termination.

Dr. De Chapelle, of Bordeaux, reports a case of quotidian intermittent, in a patient seventy-two years of age, where quinine at first yielded good results, but afterward lost its effect. The patient was in a desperate state when he was placed upon one day's treatment of pambotano, which resulted in a total cure.

Since the collection and publication of these statistics numerous cures have been reported by physicians in different parts of France. The results, as reported, are so uniformly successful that the question arises whether a certain allowance should not be made for the enthusiasm which so generally attends the introduction of a new remedy.

Still more recently (*La Tribune Médicale*, April 30, 1891) Dr. J. Pelletan reports the case of a man, thirty-eight years of age, who contracted repeated attacks of malarial fever of divers types while living in various parts of South America. Returning to Paris some years since, the fever reluctantly yielded to the quinine treatment, but was followed by obstinate neuralgias in various parts of the body, and particularly by an atrocious sciatica, which caused the most intense suffering.

Notwithstanding the most varied forms of treatment, nothing afforded even temporary relief, except hypodermics of morphia.

The patient at this time was greatly emaciated, complexion of a pasty yellow with a parchment-like skin, presented a cachectic appearance, and the spleen was markedly enlarged. No history of syphilis or alcoholism.

On the 19th of January last he was ordered a dose of pambotano (Midy).

Up to the present time (April 20th) he has been entirely free from all pain, notwithstanding that he was exposed to the inclement weather of a Paris winter.

My own observations are limited to eight in number as far as the malarial fevers are concerned. Each case, however, was carefully observed for a varying period of time before the administration of the medicament in order to insure accuracy of diagnosis. I have also observed its results in other diseases, such as la grippe, typhoid fever, phthisis, etc., but, frankly speaking, no influence could be detected upon the course of these different maladies.

The preparation used in these cases was an alcoholic elixir prepared by Midy, of Paris, and kindly furnished me for the purpose by Rigaud and Chapoteaut. Each bottle of the elixir contains 90 grammes, representing 70 grammes of pambotano. The contents of each bottle is to be administered in four equal portions within the twenty-four hours in hot sweetened water or tea, and preferably taken on an empty stomach.

The cases are as follows:

CASE I.—A clergyman, forty years of age, contracted a quotidian intermittent while on a gunning trip in Virginia, six years ago. Since that time he has, without exception, been subject to a renewal of the attacks every spring, and occasionally in the fall of the year. These attacks yield to treatment by large doses of quinine and arsenic, but generally incapacitate him from work for a period of about two weeks. His present attack commenced with a chill on March 2, 1891, at 4 o'clock in the afternoon, followed by a temper-

ature of 104°, and a return of the same symptoms on the succeeding day. He commenced taking the elixir of pambotano on the 4th of March, but experienced a modified chill on the afternoon of the same day; temperature 102°. Some nausea after the first dose. Since that time he has had no return of the above symptoms.

CASE II.—Girl, aged seventeen years, employed in a mill, residing in the southern section of the city, presented herself at the Southwestern Hospital Dispensary with the history of having had a chill on the previous day followed by fever and sweating. Temperature at the present time normal, but patient feels weak and languid; tongue coated. She was directed to return the next day. On this occasion the thermometer marked 102⅘°. She commenced the pambotano the same afternoon, taking two doses on that day, and two the day following. The first dose was vomited within fifteen minutes, but the subsequent doses were retained. She remained under further observation for ten days, with no return of the fever.

CASE III.—Woman, aged thirty-seven years, dressmaker; has had attacks of quotidian intermittent in the spring of the year for the last four years, which kept her confined to the house for about ten days on each occasion. Was taken with a chill March 24th, followed by the regular symptoms, which were again repeated the next day. Commenced the use of pambotano March 26th. Some nausea after each dose, but no vomiting. Bowels opened three times during the course of the day. Resumed her occupation on the 27th, and subsequently reports (June 8, 1891) that she has been entirely well ever since.

CASE IV.—Commercial traveller, aged twenty-five years. While in Florida last autumn he was taken ill with a severe type of remittent fever, which confined him to the hotel for a period of seven weeks, and which finally yielded to large doses of quinine and arsenic. Present attack commenced April 3d with chill, fever, intense headache, coated tongue, nausea, and some vomiting. Commenced the pambotano on April 4th; the patient vomited the second, third, and fourth doses. On evening of same day he was given three grains of calomel in divided doses, to be followed by a saline. On the morning of the 5th, the fever still being present, the drug was ordered continued as on the previous day, but he again vomited the first and third doses, besides which the bowels were opened at least a dozen times. On the 6th the patient appearing no better, and the irritability of the stomach still being present, he was placed on suppositories of quinine, together with the use of Fowler's solution internally. After further treatment for about a week, the patient entered into a rather slow convalescence.

CASE V.—A woman of thirty-five years, with a distinct malarial history, had been under my care for over a year suffering from severe attacks of neuralgia in various parts of the body, but particularly of the facial type. Rarely a week passed without severe suffering on her part. Quinine, arsenic, antipyrine, and the general routine treatment, including electricity, had been without any permanent result; the same may be said of the extraction of several decayed teeth. Commenced taking pambotano on April 6th without suffering any inconvenience from the drug. The pains disappeared to a great extent until April 18th, when she experienced another attack, but milder in character, according to her testimony. Another dose of pambotano was

administered April 19th, since which time she has been free from pain, with the exception of slight twinges occurring in damp weather.

CASE VI.—Laborer, aged forty years, applied at my service at the Howard Hospital, May 2, 1891, with a tertian intermittent, the result of an attack contracted four years ago, and which has since visited him every spring and fall. Commenced pambotano the next day, since which time the fever has not returned.

CASE VII.—Laborer, aged thirty-five years, applied at the Howard Hospital May 22d with a tertian intermittent, which, he thinks, he contracted while digging at Greenwich Point. Some irritability of the stomach being manifested, small doses of calomel were ordered for that day. Commenced pambotano on the 23d, but vomited the third dose. Slight chill on morning of the 24th. Drug continued during the day, after which no further treatment was necessary.

CASE VIII.—Laborer, aged thirty-two years, applied at the Howard Hospital June 2d with quotidian type of fever, headache, vomiting and diarrhœa. Commenced pambotano June 3d, but vomited each and every dose. Drug continued June 4th, and only the last dose was vomited, but the number of intestinal movements was greatly increased and accompanied by some griping pain. The fever not being apparently influenced, he was placed under large doses of quinine, and is now entering convalescence.

As will be seen by the above, my results, although decidedly encouraging, are not so uniformly successful as some of the reports from abroad. In the two cases where the exhibition of the drug remained apparently without result, the question may arise as to whether a sufficiently large quantity was really absorbed on account of the gastro-intestinal irritability. Indeed, this undesirable feature seems to play a more or less important part in most of the cases.

For the above reason it would seem especially desirable that an active principle should be isolated. And we can only wonder that this has not already been accomplished in a drug whose action seems to be sufficiently pronounced to obtain marked results within such a comparatively short period of time.

In conclusion, it would seem to me that the results already obtained are sufficient to encourage further work in this direction, especially as our opportunities for observing malarial fevers are better than those of the French physicians.

DISCUSSION.

DR. JAMES COLLINS: In our reports on malaria we are apt to lose sight of the fact that we have two distinct kinds of malaria, one the malaria of swamps and the other the malaria of great cities. This drug seems to have

been used principally in the malaria of cities, and the results seem analogous to those of a remedy which we have in our own country, the Eupatorium perfoliatum. The paper read to-night is so much like a paper I heard read some fifteen or twenty years ago, on the drug mentioned, that I could not refrain from mentioning it.

DR. THOMAS J. MAYS: This drug is entirely new to me, but it seems that it does not act like quinine. From the reports which we have presented to us here it appears that at least a part of its action is confined to the gastro-intestinal canal, stimulating the biliary secretion, etc. We know of many agents which antagonize malaria by acting in this way. Chloride of ammonium, calomel, hydrastis Canadensis are given, and have an excellent influence on malaria, and I think chiefly because they act upon the liver. Quinine is a remedy which stands by itself, and I was in hopes that in this agent we would find a prominent rival to it, but it seems not. I trust that Dr. Roussel will continue his researches into the remedy which seems to hold out such promising results.

DR. ROUSSEL: In reply to Dr. Collins, I would state that while my observations were made on malaria as it occurs in large cities, the studies of the foreign observers, especially those in Mexico and Italy, were on the so-called "swamp fever" of a rather intense type.

EMPLOYMENT OF PILOCARPINE MURIATE IN LABYRINTHINE DISEASE; WITH REPORT OF CASES.

By S. MacCUEN SMITH, M.D.,

CLINICAL CHIEF AURAL DEPARTMENT JEFFERSON MEDICAL COLLEGE HOSPITAL, PHILADELPHIA; SURGEON-IN-CHARGE OF THE NOSE, THROAT, AND EAR DEPARTMENT GERMANTOWN HOSPITAL AND DISPENSARY, PHILADELPHIA.

[Read June 24, 1891.]

GENTLEMEN: Our object in calling attention to the following interesting cases is, as far as possible, to determine the diseases in which pilocarpine may be of decided benefit, and, if possible, to add to its sphere of usefulness.

CASE I.—Mr. F. W., of New Jersey, twenty years of age, has been a bright scholar until within the last two years, when, on account of progressive loss of hearing, he was compelled to leave school and seek medical aid. From a critical examination of the patient, and also of his parents, the personal and family history were pronounced unusually good. The father gave positive assurance of being entirely exempt from any previous specific history, and certainly observation would substantiate his statement, as his entire family of seven children showed impressive evidence of good health.

The patient stated that he had been under treatment for three years with several specialists in neighboring cities, only to meet with discouragement, as his hearing continued to grow worse.

On examination the external ear and canal were found to be normal; membrana tympani slightly opaque and retracted, otherwise normal, except some inflammation the extent of the manubrium mallei. In the post-nasal space the pharyngeal tonsils were found to be much enlarged, the hypertrophy extending beyond and occluding each Eustachian tube. Very low notes of both aërial and osseous conduction of sound were perceived in each ear—the higher notes not being heard except when intense—which would seem to prove that the internal ear was at fault; and as the voice could be heard much better than the watch-tick, this would offer additional evidence of internal ear disease. By my watch, which measures fifty inches, the hearing distance of R. E. $= \frac{1}{L}$; of L. E. = quite negative; and yet ordinary conversation from the bass voice could be heard at six feet, but individual words could not be distinguished until the sound-wave was intensified.

By removing the enlarged tonsils and post-nasal adenoid growths the hearing power was somewhat increased by equalizing the atmospheric pressure, and thus to an extent correcting the retracted condition of the membrana tympani. Knowing this patient to have been under special treatment for some time, and that the usual methods of procedure had failed to give relief, we deemed a repetition of the same to be a useless experiment, and therefore concluded to place him under the pilocarpine muriate treatment, by hypodermic injections. As the object of such treatment is to produce profuse diaphoresis, the dose to be employed must be in accordance with individual idiosyncrasy. It has been our custom to commence with a small dose, one-sixteenth to one-eighth grain, and gradually increase, until the full physiological effects of the drug are produced, provided contra-indications (*to be determined by previous careful examination*) do not manifest themselves.

The dose usually employed is one-sixth grain, although one-fourth grain is frequently necessary. In view of the danger to life that is possible to occur in administering full doses of pilocarpine, Dr. Lawrence Turnbull and other authors advise the use of atropine or strychnia in conjunction with pilocarpine. This is certainly a proper and safe precaution, and should be employed in selected cases; yet, in the greater number of cases, the writer does not find this essential.

As patients cannot usually stand the daily injection, it is our custom to administer one hypodermic every second day; always insisting on the patient remaining *in bed* from three to five hours after each treatment, as the perspiration continues for that length of time, and any undue exposure or exertion may produce unfavorable symptoms. These hypodermics are continued until five, eight, or ten have been given, and then, if additional ones are required, they may be administered at intervals of five to ten days, as the symptoms indicate.

We will now relate the treatment and improvement of the case in question, the details of which are purposely given, as they are intended to express in the main the general treatment and improvement of the subsequent cases; the points of difference, however, will be mentioned in each case.

February 2, 1889, we gave the above case the first hypodermic of one-eighth grain (the hearing distance, you will remember, was R. E. $\frac{1}{L}$, L. E. negative); next day patient thought tinnitus was much less severe; no improvement in hearing; perspiration not profuse. February 4th, gave hypodermic of one-sixth grain, which caused copious diaphoresis, some nausea, and headache. During that evening patient heard wagons passing his window, but could not hear the music from some stringed instruments only fifteen or twenty feet away; his hearing for conversation had materially increased; tinnitus about the same; watch-tick, R. E. $\frac{2}{L}$, L. E. $\frac{4}{L}$. It is

interesting to note the marked improvement in left ear, which up to this time had been negative.

6th. We repeated hypodermic injection of one-sixth grain, as we found this to produce full physiological effect; perspiration about the same; absence of nausea and headache. The next day patient called and stated his hearing had never been so bad, he being unable to hear anything except very intense *high* notes; he was, therefore, much discouraged; all his previous hopefulness having vanished, he refused to submit to further treatment. However, he called the following day and informed me he would continue treatment, as "he thought nothing could possibly make him worse." The peculiar effects of this last hypodermic were the almost entire loss of hearing and the change to perceiving *only high* notes.

8th. One-sixth grain was again given, which resulted in the hearing being restored to R. E. $\frac{3}{L}$, L. E. $\frac{3}{L}$; tinnitus almost gone; feeling much better in general health and spirits.

10th and *12th.* He received one-sixth grain, with marked improvement in hearing; R. E. $\frac{9}{L}$, L. E. $\frac{11}{L}$; no tinnitus; general health continues to improve.

At this date *patient's father* called to be treated for "some fever blisters on tongue and throat," which, on examination, presented such questionable appearances that I, without hesitation, pronounced them syphilitic. He then admitted having had a chancre when twenty years old (his age at this writing being forty-nine). His excuse for previous false statements was that every physician whom his son had heretofore consulted questioned his family history, and a confession on the part of the father invariably resulted in the son being put on large increasing doses of iodide of potassium and mercury, which so impaired his health that the treatment was discontinued; and as his son had never improved under such medicament, he concluded to conceal his family history, with the hope that other methods of treatment might be pursued.

Granting that the patient's impairment of hearing was specific in origin, in view of his marked improvement I thought it wise to continue with the pilocarpine treatment, in order to more thoroughly establish its efficiency in this class of cases.

The hypodermics were continued on February 14th and every second day thereafter until eight had been given, at which time his hearing distance was, R. E. $\frac{26}{L}$, L. E. $\frac{32}{L}$; general health improving daily; his weight has increased seven pounds; tinnitus aurium entirely gone.

21st. The patient returned home, feeling that he had entirely recovered; but in two weeks he called again at my office with hearing somewhat impaired—R. E. $\frac{22}{L}$, L. E. $\frac{26}{L}$—which he thought came from "catching cold," due to exposure. I again gave him three hypodermics, his hearing increasing to R. E. $\frac{36}{L}$, L. E. $\frac{39}{L}$. Additional hypodermics did not improve the hearing. Thinking he required some *specific* treatment, and remembering

that iodide of potassium and mercury could not be tolerated by his stomach, I prescribed Hostelley's syrup of hydriodic acid in two-drachm doses, four times a day, well diluted in water; also inunctions of one drachm of ung. hydrarg. each night and morning. This treatment was continued for six months without experiencing any inconvenience, his hearing remaining about the same; no tinnitus; general health better than ever before, and at this writing—about fifteen months since beginning treatment—his hearing and general condition continue to be good, although the patient has not been taking any medicine for the past nine months.

CASE II.—Mr. S. G., of Pennsylvania, aged seventy-one years, consulted the writer, with his family physician, July 8, 1888, and gave the following history: On January 6th of the same year, when arising at his usual hour, he was much alarmed at not hearing the customary noise on the street; thinking, however, that his servant had by mistake awakened him at too early an hour, he consulted his watch, and, on finding the hour rather later than usual, and as everything appeared distressingly quiet, he realized that his hearing had been entirely lost during the night. This complete loss of hearing was not attended with pain, tinnitus aurium, discharge from the ears, nor inconvenience of any kind.

After being under treatment for three months, and not receiving the slightest benefit, while drinking some hot milk by the direction of his physician, he was seized with intense tinnitus aurium, vertigo, and constant emesis *without nausea*, but with entire absence of pain. The emesis continued for only three hours, but the tinnitus and vertigo increased in severity.

In this condition the patient consulted the writer. A more despondent and pitiable mortal could not be imagined. He was not able to walk without assistance, and the tinnitus had prevented sleep for almost two weeks. The membrana tympani and the external auditory canal were normal, excepting the changes peculiar to a person of his years; the post-nasal space, including the Eustachian tubes, were in good condition; in brief, both ears and their appendages presented the usual normal condition in so far as observation alone could determine. In this connection it is interesting to note the entire absence of evidence of disease in such cases. Osseous conduction of sound was well marked, especially in left ear; aërial conduction of sound was quite lost in both ears.

The family physician informed me that his patient had been on large increasing doses of iodide of potassium and mercury, but the stomach would no longer retain the potassium iodide.

We subjected this patient to the pilocarpine treatment, as previously described, with the following results: First treatment resulted in slight decrease in vertigo and tinnitus, but hearing power remains the same; caused some temporary vomiting, which was quite severe for two hours. The second and third hypodermics were given without any appreciable benefit; the fourth and fifth, however, were productive of marked improvement in vertigo and tinnitus, and at the same time caused such changes in the perceptive organs of hearing that he was able to hear intense waves of sound. After the sixth treatment tinnitus and vertigo had almost ceased, and hearing distance increased to $\frac{1}{L}$ in both ears. The seventh and eighth treatments

did not produce much change in hearing distance, but entirely relieved vertigo and tinnitus. The ninth hypodermic caused much improvement in hearing: R. E. $= \frac{9}{L}$, L. E. $= \frac{11}{L}$.

The patient found it necessary to return home, and I directed his family physician to continue the treatment until four additional hypodermics had been given, at the end of which time patient called, with this marked improvement: R. E. $= \frac{21}{L}$, L. E. $= \frac{27}{L}$. The patient's business called him to the far West, and required his being away for four months. I gave him Hostelley's syrup of hydriodic acid to take during his absence. On his return the condition of hearing was almost normal, and remains the same at this writing.

While the writer is well aware that syphilitic disease of the organs of hearing is usually attributed to the middle ear, yet most of the cases herein detailed responded to the tests which distinguish internal from middle-ear disease. As several patients gave positive assurance of non-specific history before treatment, and yet after recovery acknowledged having had syphilis; and as patients generally are slow to acknowledge such questionable matters, it is my custom to treat most cases of deafness accompanied by tinnitus, especially if of recent occurrence, with subcutaneous injections of pilocarpine muriate. On this point Politzer (who was the first to introduce and use pilocarpine in internal ear disease), in speaking of "labyrinthine syphilis," says: "In recent cases, I have had several favorable results from the subcutaneous injection of a two per cent. solution of muriate of pilocarpine, in increasing doses of from 4 to 12 drops;" also, "that *this treatment should be first used*, and iodine or mercury resorted to should the pilocarpine injections have no marked effect after eight to fourteen days."

As the details of a large number of such cases would consume much time and space, and withal prove tiresome, the object of this paper will have been accomplished by briefly stating that the writer has treated forty-seven cases of greater or less impairment of hearing—some amounting to almost entire deafness—by the method of hypodermic injections of pilocarpine muriate. Of these forty-seven cases, he was enabled to record the results of treatment in all but three; the remaining forty-four cases being herewith presented in tabulated form.

TABLE OF CASES.

Name.	Sex.	Age.	Occupation.	Duration of impaired hearing.	Hearing distance before treatment.		Discharge.		Sudden deafness.	Specific history	Tinnitus.	Vertigo	Number of hypodermic injections.	Hearing distance after treatment.	
					R. E.	L. E.	R. E	L. E.						R. E.	L. E.
F. W.,	M.	20	Scholar,	3 years,	1-50	0	No	No	No	Yes	Yes	No	18	36-50	39-50
S. G.,	M.	71	Business,	6 months,	0	0	No	No	Yes	Yes	Yes	Yes	13	40-50	40-50
M. H.,	M.	42	Merchant,	9 years,	1-50	0	No	No	Yes	Yes	Yes	Yes	16	29-50	7-50
J. D.,	M.	17	Scholar,	7 months,	4-50	9-50	Yes	Yes	No	No	Yes	No	4	48-50	50-50
M. D.,	F.	29	Housewife,	2 months,	0	0	No	No	Yes	Yes	Yes	Yes	7	50-50	41-50
S. M.,	M.	56	Broker,	1 year,	3-50	0	No	No	No	Yes	Yes	No	11	50-50	43-50
F. B.,	F.	43	Bookkeeper,	9 years,	1-50	3-50	Yes	Yes	No	No	Yes	No	4	0	0
I. S.,	M.	22	Scholar,	4 years,	5-50	5-50	No	No	No	Yes	No	No	9	21-50	12-50
J. H.,	M.	10	Scholar,	6 years,	10-50	10-50	Yes	Yes	No	No	No	No	5	10-50	10-50
J. D.,	M.	68	Farmer,	12 years,	0	0	No	No	Yes	Yes	Yes	Yes	12	46-50	49-50
W. A.,	F.	36	Typewriter,	3 years,	4-50	3-50	No	No	No	Yes	Yes	No	7	9-50	10-50
A. S.,	M.	43	Telegraph operator,	7 months,	11-50	11-50	Yes	Yes	No	Yes	No	Yes	6	34-50	43-50
B. B.,	M.	54	Merchant,	26 years,	3-50	1-50	No	Yes	No	No	Yes	No	6	0	2-50
C D.,	M.	67	Merchant,	24 years,	1-50	1-50	No	No	No	Yes	Yes	Yes	3	41-50	47-50
E. M.,	M.	49	Merchant,	8 years,	6-50	6-50	Yes	No	No	No	No	No	8	2-50	4-50
G. S.,	F.	31	Housewife,	2 months,	16-50	19 50	Yes	Yes	No	No	Yes	No	7	16-50	16-50
L. D.,	M.	46	Clerk,	1 week,	0	0	No	No	Yes	Yes	Yes	Yes	10	48-50	45-50
S. D.,	M.	27	Telegraph operator,	4 days,	2-50	10-50	No	No	Yes	Yes	No	Yes	7	27-50	28-50
J. S.,	F.	12	Scholar,	9 years,	12-50	11-50	Yes	Yes	No	No	No	No	5	9-50	11-50
C. W.,	M.	44	Tailor,	11 years,	6-50	6-50	No	No	Yes	Yes	Yes	No	4	14-50	17-50
H. H.,	M.	9	Mill hand,	6 years,	12-50	12-50	Yes	Yes	No	No	Yes	No	3	12-50	17-50
F. K.,	F.	24	Mill hand,	6 months,	21-50	12-50	No	No	No	Yes	Yes	Yes	6	48-50	50-50
J. T.,	M.	49	Clerk,	12 years,	5-50	7-50	No	No	Yes	Yes	Yes	Yes	4	39-50	44-50
J. S.,	F.	63	Maid,	12 years,	4-50	4-50	No	No	No	Yes	Yes	No	11	44-50	39-50
S. S.,	M.	41	Laborer,	21 years,	1-50	2 50	Yes	Yes	No	No	No	No	7	2-50	2-50
I. B.,	M.	53	Banker,	32 years,	4-50	4-50	No	No	Yes	Yes	Yes	Yes	14	50-50	50-50
F. J.,	M.	28	Mill hand,	20 years,	2-50	2-50	Yes	Yes	No	No	No	No	8	3-50	2-50
H. C.,	M.	12	Mill hand,	9 years,	9-50	9 50	Yes	Yes	No	No	No	No	6	9-50	9-50
B. A ,	M.	66	Farmer,	4 years,	3-50	3-50	No	No	Yes	Yes	Yes	Yes	7	42-50	46-50

TABLE OF CASES.—*Concluded.*

Name.	Sex.	Age.	Occupation.	Duration of impaired hearing.	Hearing distance before treatment.		Discharge.		Sudden deafness.	Specific history	Tinnitus.	Vertigo	Number of hypodermic injections.	Hearing distance after treatment.	
					R. E.	L. E.	R. E.	L. E.						R. E.	L. E.
A S.,	F.	41	Housewife,	3 months,	10-50	11-50	Yes	Yes	No	No	Yes	No	9	12-50	12-50
G. B.,	M.	29	Laborer,	3 weeks,	0	0	No	No	Yes	Yes	Yes	Yes	4	43-50	50-50
H. D.,	M.	27	Clerk,	3 days,	0	0	No	No	Yes	Yes	Yes	Yes	5	50-50	50-50
A. S.,	M.	7	Scholar,	5 years,	20-50	18-50	Yes	Yes	No	No	No	No	7	21-50	18-50
D. S.,	F.	24	Housewife,	16 years,	11-50	11-50	Yes	Yes	No	No	No	No	11	27-50	26-50
L. A.,	M.	42	Farmer,	20 years,	1-50	14-50	No	No	Yes	Yes	Yes	Yes	6	39-50	47-50
S. D.,	M.	39	Laborer,	7 years,	7-50	7-50	Yes	Yes	No	No	Yes	No	3	36-50	42-50
L. D.,	F.	18	Scholar,	12 years,	17-50	12-50	No	Yes	No	Yes	Yes	No	5	20-50	19-50
A. S.,	M.	33	Clerk,	21 years,	10-50	10-50	Yes	Yes	No	No	No	No	10	11-50	10-50
M. H.,	M.	56	Broker,	11 years,	2-50	1-50	No	No	No	Yes	Yes	Yes	4	47-50	50-50
J. G.,	M.	58	Lawyer,	3 years,	4-50	4-50	No	No	No	Yes	Yes	No	7	23-50	19-50
W. J.,	M.	44	Physician,	6 months,	2-50	1-50	No	No	Yes	Yes	Yes	Yes	9	43-50	46-50
J. W.,	M.	19	Scholar,	12 years,	16-50	12-50	Yes	Yes	No	No	No	No	7	15-50	19-50
M. D.,	F.	22	Housewife,	7 months,	0	0	No	No	Yes	Yes	Yes	No	2	43-50	50-50
E. S.,	M.	61	Insurance agent,	27 years,	4-50	4-50	No	No	Yes	Yes	Yes	Yes	12	31-50	3-50

To briefly summarize: Of the forty-four cases herewith recorded, thirty-three received very marked relief, as shown by the increase of hearing power; seven cases were but slightly improved, and four received no benefit whatever. The improvement in tinnitus aurium and vertigo was in most cases in direct ratio to the increase in hearing distance and the improvement in general health; although in fourteen cases the vertigo was alone relieved, while the tinnitus remained the same, or but slightly improved.

In closing, the writer desires to state that the success attained (about 75 per cent. of the cases treated) has encouraged him in calling the attention of the profession to this method of treatment; and furthermore, that from his experience and observations in this series of cases he feels justified in expressing the following conclusions:

I. That age and sex have no influence on the success or failure of treatment.

II. That in recently developed deafness with tinnitus this treatment is much more hopeful of success than in cases of longer duration. In one case, however, which was of specific origin, the patient, aged seventy-two years, had been almost deaf for twenty-two years, and yet this was one of the most successful cases treated. Nevertheless, this must be considered as very exceptional.

III. That cases of chronic suppurative otitis media with some degree of impaired hearing, resulting from the exanthematous fevers, are not proper cases to receive benefit from this method of treatment.

IV. That deafness, vertigo, and tinnitus arising from syphilis seem to be especially benefited by the subcutaneous injection of pilocarpine.

V. That these results can only be attained by pushing the pilocarpine to its full physiological effect, and that *profuse diaphoresis* must be obtained in every case.

PETROLATUM.

By JOHN AULDE, M.D.

[Communicated June 24, 1891.]

In the preparation of the last edition of the United States Pharmacopœia (edition of 1880), the word "petrolatum" was coined to meet a demand on the part of the medical profession for certain proprietary articles which at that time were prepared by a patented process. These products, variously known as cosmoline and vaseline, had early attracted the attention of the profession, and it was believed that some instruction in regard to their manufacture might be of service to both physician and pharmacist. Even at the present time, notwithstanding the very general uses of these products, there is still a great want of knowledge in both the medical and pharmaceutical professions in regard to their character and their more specific applications. My object to-night will be directed to a study of some of the different preparations which are derived from the crude petroleum, with the exhibition of samples, together with some brief reference to the therapeutical indications. Having used the products now for several years past, I made a collection of these samples in order to become familiar with them myself, with the expectation that I would prepare a paper dealing somewhat elaborately with their employment in medicine, because we are now convinced that they will be very extensively employed in the treatment of diseased conditions.

Petrolatum products are used by the veterinarian and by the dermatologist in the preparation of ointments, salves, etc.; and they are also used by the physician internally in the treatment of various affections. Actors and actresses also use them in making-up for the stage, before applying paints and powders, which would seriously damage the skin; a colorless cosmoline is rubbed over the face, so that when the performance is ended and it becomes necessary to remove the stage make-up, a little Cologne or Florida water, or bay rum, is used to saturate a towel or piece of soft muslin, and the whole is

readily removed, without in the least injuring the integument. It was found that the yellow cosmoline or vaseline could not be used without causing more or less discoloration, depending upon the delicacy of texture, some persons being much more susceptible than others. I am reminded here to say that colorless petrolatum is now to be found in the market under various names, such as "alboline" and "blancoline" in this country, and "lucelline" in Great Britain, but I understand that all of these various products are made substantially in the same manner, and that whatever differences appear to the eye depend upon the presence or absence of color and the higher or lower melting-point of the finished product. The word "cosmoline," as you are probably aware, was invented by the manufacturer, and is derived from the word "cosmos," the inventor or discoverer believing that its use would become universal, and I am advised that he has lived to witness the fulfilment of his early prophecy.

Through the kindness of Mr. W. H. Brill, of this city, a practical chemist, who has charge of extensive refining works, I made a personal examination of the methods of manufacture, and learned some interesting details in regard to the preparation of this valuable product. The workmen at the factory told me that when they were attacked with a bad cold (acute catarrh), it was only necessary to stuff the nasal cavity with an ounce or two of semi-solid substance, and in the morning the symptoms had all subsided, no further treatment being necessary. These products, which I will show you presently, are obtained from the crude petroleum, which was known in former years as "rock oil," by the process known as fractional distillation. The first twenty per cent. of the distillate is called naphtha, and embraces several products with which we are more or less familiar, such as rhigolene, benzine, gasoline, and naphtha proper, which means nothing. The fifty per cent. following embraces the various brands of illuminating oils, which vary all the way from a fire-test of 110 degrees to 300 degrees, and they also vary in their specific gravities, and upon these their safety and value as illuminants depend. Of the thirty per cent. remaining, the first half, or fifteen per cent., is referred to as a neutral product, while the remainder (fifteen per cent.) is called "petrolatum stock." The first occurs in the form of a heavy oil, the second as a semi-solid. The former is now used, after purification, to some extent internally, and I am of the opinion that it will ultimately find a number of uses, owing to the fact that it possesses valuable properties which may be utilized in the treatment of disease. The latter is

less convenient for internal medication, because it must first be reduced to a liquid form by heating.

Before either of these substances can be used as medicaments, however, they are subjected to certain processes requisite for their purification. The coloring matter is removed by exposing the oil to bone-black (animal charcoal) in a percolator, at a suitable temperature. My attention was called to a series of percolators, each sufficient to contain a ton of animal charcoal and twenty-five or thirty barrels of oil. Owing to the large quantity of bone-black required for the purpose, the price of the colorless product is considerable. Next in order is the removal of the paraffin wax, which is effected by a process called "cracking," and subsequent freezing, when the entire mass is subjected to hydraulic pressure. It will thus be seen that both the neutral product, and "stock" may be prepared perfectly colorless, or a part of the coloring matter may be allowed to remain, by which the expense to the consumer is rendered considerably less. This neutral oil is now in the market in different forms, and under different names. The product which I now show you is about the color of cosmoline or vaseline, but occurs in the form of a liquid, because it does not contain more than about twenty per cent. of paraffin wax. It corresponds closely with that preparation known as terralline, a remedy now extensively advertised as a cure for consumption.

You will readily understand how a remedy of this nature might be serviceable in various affections. It possesses the properties of a lubricant (non-irritating), because of the contained oil; it is also a sedative, owing to the presence of this paraffin wax, which will take the place of sedatives of a more substantial character, and will afford prompt relief when we have to deal with inflammatory conditions of the alimentary tract. I am of the opinion that it will eventually supersede bismuth and similar substances, for the very important reasons that, while acting as a sedative, it will at the same time enact the rôle of an antiseptic, by preventing the absorption of poisons during the progress of such disorders as typhoid fever, yellow fever, cholera, peritonitis, and especially will it be useful in the treatment of the usual summer diseases of children. There is still another reason for believing that petrolatum products will find a permanent place in the armamentarium of the physician, particularly in the class of diseases just mentioned, viz., their well-known solvent properties.

The first sample to which I call your attention is variously known as glycoline, alboline, lucelline, blancoline, and similar names. It is about the same consistence as glycerin and colorless, and contains no

wax. It is perfectly innocuous, almost tasteless, except the oily sensation, and can be taken internally in any reasonable quantity. The "liquide paraffin" of the German Pharmacopœia, which goes with this sample, is quite like the American product. The probability is that no difference exists aside from the specific gravity, and, therefore, whatever is claimed for one of the products named will be quite as applicable to another, without regard to its manufacture. This oil, in addition to its being used in medicine, is very largely used for adulteration.

I next show you a number of samples of petrolatum products which are semi-solid in character, prepared from petrolatum stock. They vary in color from the pure white to the crude petrolatum, which is almost black. These will show the perfection that has been attained in the manufacture of a product which twenty-five years ago was not regarded as of much value.

Finally, let me call your attention to a specimen in the form of lung tissue made transparent, which has been made possible through the agency of paraffin wax. This specimen was presented to me by Dr. Roosevelt, of New York, and the method of preparation is about as follows: A section of lung structure is thoroughly washed with water, then with alcohol, and later de-alcoholized, when it is injected with a combination of oil of cedar and oil of cloves, prepared in such proportion that the refraction is the same as that of the lung structure. The specimen is then surrounded with a preparation of which paraffin wax is the base, and frozen, either by contact with ice or dipping in cold water, when sections can be made of almost any thickness.

DISCUSSION.

DR. S. SOLIS-COHEN: I use petroleum products in two ways—one internal, and the other as a vehicle for applications to the mucous membranes. Crude petroleum is very valuable in the treatment of pulmonary complaints, especially certain stages of phthisis. It is useful combined with iodoform. Two or three grains of iodoform may be combined with an equal quantity of crude petroleum and administered in capsules. So-called alboline, or a modification of it called benzonole, is useful as a vehicle for menthol and other agents, to be applied to the respiratory mucous membrane.

MR. BRILL: There is little to be added to what has been said by Dr. Aulde. Few physicians seem to know anything about the practical preparation of these products. The idea seems to be that cosmoline is a by-product. It never was a by-product. It is really the most valuable part of the petroleum distillation.

The first 70 per cent. of the distillate is worth probably five cents a gallon, while the remaining 30 per cent. is worth from twelve to twenty-five cents a gallon. The quantity of these products has greatly increased. Where pounds were used ten years ago tons are now used, and it is sent all over the world.

DR. ROBINSON: I wish to refer to a single experience with liquid cosmoline. A man came to me with acute gonorrhœa and was anxious that something be done to relieve him at once. I injected about two drachms of liquid vaseline into the urethra. The symptoms at once began to subside and the man had a very short attack—the second and third stages being absent. I do not know that the injection had anything to do with it, but I thought it well to relate this experience.

DR. WILLIAM F. WAUGH: A few years ago an effort was made in France to introduce petroleum products as vehicles for the hypodermic use of remedies. It was shown that the purified oils were innocuous, as much as a kilogramme having been injected beneath the skin of a horse at one time without causing irritation. In some respects the experiments were of value. It was shown that in this way twenty minims of purified creasote could be introduced at a single dose. If creasote is useful at all in phthisis as a germicidal remedy, the advantage of giving so large a quantity would render this method of some importance.

DR. JAMES COLLINS: I well remember the time when the first specimen of a curious oil, said to come from the earth, was brought to the laboratory of an eminent chemist, who proceeded to investigate it. He obtained naphthol, paraffin, and some other products from it. He brought the subject to the attention of some friends, who asked him if he had exhausted the oil. "No," he said, "the resources of chemistry would be exhausted by this agent." This was a long time ago, and the clang and clamor of the war drove the subject from my mind. When I returned to practice I began the use of these petroleum products, and since then cosmoline and alboline have been in my office constantly. I use them in nasal and throat affections. The only use in which I have been disappointed has been in phthisis. I have tried teralline faithfully, but it has failed to fulfil the promises made for it. As an internal remedy petrolatum has not been satisfactory, and it is probable that the digestion of this hydrocarbon is not as perfect as that of some other hydrocarbons.

DR. AULDE: I have nothing further to add except to say that I purpose preparing, at an early day, a paper referring to the therapeutic indications of the petrolatum products. I believe that too much has been expected of this agent. The use of these products internally should be only as an assistant or adjuvant to other constitutional remedies. They are not absorbed, and can only do good by their local effect.

HOW TO USE MYDRIATICS.

By EDWARD JACKSON, M.D.,

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC, AND SURGEON TO THE WILLS EYE HOSPITAL, ETC.

[Read June 24, 1891.]

THE present purpose is to discuss methods, not indications, for using these drugs; but, in passing, it is worth repeating, since it is so often forgotten, that remedies of this sort are too powerful to be used indiscriminately. If one has not been able to make a positive diagnosis in a case of ocular inflammation, to clearly recognize the indications, and to definitely exclude the contra-indications for one of these drugs, he should let them alone, and confine his hit-or-miss prescribing to such agents as boric acid, or weak solutions of common salt, whose power for harm is really very slight.

These drugs are applied to the eye for their direct influence on the cornea, iris, or ciliary body. In either case they must be absorbed through the cornea, the lymph streams of which are in close relation with those of the anterior chamber. Any portion of the drug that may be absorbed from other parts of the conjunctival sac is carried into the general circulation without coming in contact with the structures it is intended to influence. Any solution placed in the conjunctival sac is almost immediately diluted by the lachrymal secretion present; only the part with which it first comes in contact receives it of full strength. Now, if the amount of fluid instilled is very large as compared with the amount of tears diluting it, the dilution is of very little importance. But instillations of large amounts of mydriatic solutions are not advisable, because they give the maximum of absorption into the general circulation with the minimum of effect on the eye. And one thing to be constantly guarded against in the use of mydriatics is the excess of constitutional action. Therefore, a mydriatic solution used in the eye should be instilled so as to come immediately in contact with the cornea while of full strength; that is, it

should be placed at the upper margin of the cornea, allowed to flow over the surface of that membrane, and the closure of the lids prevented as long as possible, to allow absorption to occur before the fluid is swept away by the movements of the lids and diluted with the tears.

Instilled in this way, the concentration of the solution when it comes in contact with the corneal tissue, and consequently the amount absorbed, may be ten times as great as if the single drop of the same solution had been placed in some other part of the conjunctival sac. Thus applied, a very small drop of solution suffices to bathe the whole cornea. A dropper giving a small drop is therefore to be chosen. One is readily obtained with a small point that will drop half-minims, or even less. The use of such a dropper allows the employment of stronger solutions than it would otherwise be safe to employ, or a larger number of instillations may be made in the same space of time without producing symptoms of mydriatic poisoning.

It is by attention to such a minute point of technique that one surgeon will at once secure the dilatation of an inflamed iris, or the complete relaxation of the accommodation under homatropine, where another less careful will fail to attain the end sought, or to give relief to his patient. And even where the utmost power of the mydriatic does not need to be exerted, to obtain the effect that is required with the least danger of constitutional symptoms, or with the minimum of constitutional disturbance, is a very important point; for these symptoms, although really not indicating any danger to life, are extremely annoying and alarming to the patient. They occur quite frequently after the use of mydriatic solutions, and such occurrence has much to do with the objection of patients to the use of mydriatics in the diagnosis of ametropia.

The strength of the solution of one of these drugs to be used in the eye varies with the purpose for which it is used. To break up the adhesions in a case of iritis, the stronger mydriatics are to be employed and in strong solution. As atropine sulphate 1 to water 50, or about 10 grains to the fluidounce; daturine sulphate 1 to water 100, or about 5 grains to the fluidounce; duboisine sulphate 1 to water 100, or about 5 grains to the fluidounce; hyoscyamine sulphate or hydrobromate 1 to water 100, or about 5 grains to the fluid-ounce. The effect of either of these solutions may be somewhat increased by using cocaine with it. But the patient should not be intrusted with the cocaine solution for home use, because the temporary comfort it gives, in many cases, leads sometimes to dangerous excess. Either of the

above solutions is to be used one small drop in the eye at a time at intervals of ten minutes until the dilatation of the pupil is secured, and then at such intervals as may be necessary to maintain such dilatation; and continued three times daily until it can be replaced by a weaker solution.

In making the mydriatic attack on a case of plastic iritis, it is, to a certain extent, simply a question of whether we can get enough of the mydriatic into the eye without getting too much into the general circulation. And to accomplish this we must prevent the solution from making its way into the tear passages, and so being absorbed from the respiratory and digestive tracts, as well as from the conjunctiva. For this purpose it is often recommended to make pressure on the inner canthus. But such pressure is quite ineffective. Even the placing of a little clamp on each canaliculus, as proposed by Dr. Tansley (*Trans. Amer. Ophthalmological Society*, 1888), does good mainly by the displacement of the puncta that it causes. The most effective means is to so draw on the skin of the lids as to evert the puncta, and hold in contact with them a small pledget of dry absorbent cotton. This will prevent the passage of any fluid from the eye into the lachrymal sac, and permit us to apply the mydriatic vigorously to the cornea.

For paralyzing the accommodation of the eye, solutions of the same drugs of about half the above-mentioned strengths may be instilled three or four times daily.

Probably a single efficient instillation of this kind, or at most two or three, would be sufficient to produce complete paralysis of the accommodation in almost every case, with the eye in anything like normal condition. But frequently the instillation must be intrusted to unskilled hands, and so may produce but a small fraction of its full effect, and in a few cases the active hyperæmia, caused by the mydriatic and involving the anterior segment of the globe, may increase the difficulty of attaining complete ciliary paralysis; so that it may be necessary to continue such applications for some days.

For simply paralyzing the accommodation, however, our most valuable agent is homatropine, commonly used in the form of the hydrobromate. Of this a 2 or 3 per cent. solution, ten or fifteen grains to the fluidounce, should be instilled every five or ten minutes until at least four efficient applications have been made. Used in this way, I have found it a perfectly reliable and efficient paralyzant of the accommodation, even in the presence of high grades of retino-choroidal irritation and general hyperæmia of the eye. But we have not with

this drug the excess or reserve of power to control the ciliary muscle that is possessed by the other mydriatics named. Every instillation or at least a sufficient number of them must be efficient. The cornea must have the chance of absorbing the solution at nearly its full strength; and for that reason the application of the drug must be intrusted only to skilled hands, usually attended to by the surgeon himself.

To bring about simple dilatation of the pupil, our choice of the drug will be determined by whether the dilatation is to be long sustained as a measure of treatment, or only temporary as for purposes of diagnosis. In the former case atropine is to be used, in the latter homatropine or cocaine. Atropine or homatropine should be employed in a solution one-tenth the strength of those used for paralyzing the accommodation, or even weaker than this. The atropine to be repeated as often as the pupil contracts again, say once every one, two, or three days; the others, of course, used only the once.

Cocaine, which is of especial value as a dilator of the pupil, is to be used in solutions of the strength ordinarily employed for producing local anæsthesia of the eye, that is, 2 to 4 per cent. But the instillation must be made at least thirty minutes, often an hour, before the dilatation is desired. The anæsthetic action often having quite passed away before the dilatation of the pupil becomes noticeable, and repeated instillations do not very greatly hasten this dilatation. As a paralyzant of accommodation cocaine has very little power, and by itself is not at all valuable for the purpose. But it can sometimes be advantageously combined with homatropine. Here the frequent repetitions of the instillation, as in the case of iritis, give the advantage of local anæsthesia, greatly lessened resistance on the part of some patients, and prevention of the excessive secretion of tears that follows each instillation of homatropine alone, and by dilution of the solution lessens the intra-ocular effects produced, as well as an apparent hastening of absorption. For this purpose the solution may be made with 2 or 3 per cent. each, of cocaine and homatropine.

The instillation of a strong solution of any of the mydriatics causes a pericorneal hyperæmia, which, though not serious, is sometimes alarming to the patient or his friends. This phenomena I pointed out in a paper on Homatropine, published in *The Medical News*, July 24, 1886. It is especially liable to occur from the use of homatropine, because this is more likely to be used in stronger solutions. The combination with cocaine lessens this tendency to a considerable extent.

DISCUSSION.

DR. T. B. SCHNEIDEMAN: I wish merely to call attention to the change which takes place in mydriatics when kept in solution, from the formation of a precipitate due to the growth of a fungus. I do not think that this interferes with the efficiency of the solution, although it may increase the pain. We should also remember that when we entrust the mydriatic to the hands of the patient or his friends, we often fail to get complete paralysis of the accommodation. In hospital work we often find the mydriasis disappointing on this account.

AN OPHTHALMOSCOPE FOR GENERAL USE.

By EDWARD JACKSON, M.D.,

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC, AND SURGEON TO THE WILLS EYE HOSPITAL, ETC.

[Read September 9, 1891.]

It would be a great gain to both doctors and patients if a much larger proportion of those who class themselves as general practitioners were able, when the need for it arose, to use the ophthalmoscope. One who has no practical experience with it cannot even properly appreciate what he reads or hears of ophthalmoscopic appearances. And there are in the aggregate many cases in which the progress of general disease could be far more intelligently followed by its routine use, without entering upon debatable ground or attempting to use symptoms of doubtful significance.

With the ophthalmoscope, as with other instruments, the cheap instrument is very apt to lack certain important features, and the costly instrument is mainly confined to the possession of those who mean to use it a good deal. It took many years to adapt the microscope to the needs of clinical work, to rid it of mechanical stages and other mechanical nuisances, and perfect its really essential parts. And the ophthalmoscope must pass through a similar pruning and adaptation before its use can be truly popular and common in the profession. For some years I have been working at this problem, and herewith present my results.

The ophthalmoscope for general use must: First, be one in which the difficulties of using the instrument are as far as possible overcome. Second, it must be one that will be as satisfactory as any of the best instruments for any case that is likely to be encountered. Third, it must be cheap. For this one I have no hesitation in claiming that with it the fundus of the eye can be seen as readily as with any ophthalmoscope heretofore made; for all practical purposes as a refraction ophthalmoscope, its lens series is complete; it can be bought for eight dollars.

It is easy to see through, because the mirror, which is circular, 30 mm. in diameter, tilts each way to the best angle, at about 25 or 30 degrees; it has a shorter canal and wider lenses than have most first-class refraction ophthalmoscopes; each lens is retained in exact position by a spring stop; and all the lenses or combinations of lenses are available without taking the instrument from the eye.

The lens series is furnished by combinations of six lenses in two slides, and consists of convex 1, 2, 3, 4, 6, and 12 dioptres; concave 1, 2, 4, 6, 10, and 22 dioptres. To appreciate this series one must bear in mind the degrees of ametropia that are commonly encountered in practice. Among 4000 eyes, the statistics of which I have published in the *Transactions of the American Ophthalmological Society* for 1889, only one eye had hyperopia of 13 dioptres, and only one eye had myopia of 23 dioptres.

The series does not contain half-dioptres, which are given in all the larger refraction ophthalmoscopes; but a very prominent ophthalmologist has recently said that he had the half-dioptre lenses taken out of his large instrument (Noyes's modification of Loring's) as comparatively worthless. Under especially favorable conditions there are a few ophthalmoscopists who have constant and extensive practise with the instrument who can I believe measure refraction with a little more exactness with half-dioptre lenses than they could with only whole-dioptre intervals. But the ophthalmoscopists that can do this are comparatively few, the cases in which they can do it are few, and the practical value of doing it is utterly insignificant. For those who are not in special practice half-dioptre intervals are always a delusion and snare, a hindrance, a cause of inaccuracy. They are, therefore, discarded.

Although the statistics above referred to show that in but one eye in 40 of those encountered in practice is the degree of ametropia over 6 dioptres, to one not very familiar with the properties of lenses the intervals between the stronger lenses of this series may seem too great. Such must be reminded that the effect of every intermediate lens strength may be obtained by slightly varying the distance of the lens and instrument from the patient's eye. Thus the convex 6-dioptre lens acts as such only when placed against the eye; by drawing it back less than three inches it is made to act as a 12-dioptre lens, and within that space will correct any intermediate amount of hyperopia. By withdrawing the 12-dioptre convex lens a little over one inch it takes the place of a 20-dioptre lens. On the other hand, by withdrawing the concave 22-dioptre lens a little over two inches its effect is dimin-

ished to 10 dioptres, and in that space every intermediate strength is reproduced. In the same way the withdrawal of the 10-dioptre concave lens to the same distance gives us the 6-dioptre effect.

When this is remembered it is readily seen that any measurement of refraction by strong lenses is utterly untrustworthy unless the distance of the lens from the eye is taken into account; and if it is taken into account, any additional intermediate lenses are quite unnecessary. The above series is sufficient for the direct method in all cases except the very highest myopia, for which the expert ophthalmoscopist is apt to resort to the indirect method as more satisfactory.

To one accustomed to using a disc ophthalmoscope the arrangement of lenses as here in slides will at first seem awkward and confusing, but to one who begins with this instrument, or who has already used an instrument in which the lenses are so placed, it is especially conenient. The convex lenses are all in the back slide, the concaves in the front. One can be used alone, or both slides can be moved at once by the tip of the same forefinger, according to the lens required.

In the focus of the mirror, the size of the sight hole, the blacking of it, the proportioning of the instrument, and its mechanical execution, it is to equal the best ophthalmoscopes now used. It is made by Mr. D. V. Brown, of Philadelphia.

Since this is not my first attempt at the modification of the ophthalmoscope, and another instrument has my name associated with it, perhaps it will prevent confusion if I exercise the right of naming this. And with the idea of giving it a name that shall by a single word indicate the idea of its design for general use, I shall call it the POLYCLINIC OPHTHALMOSCOPE.

SWEET OIL IN THE TREATMENT OF GALL-STONES.

A Collective Investigation by the Therapeutic Section of the Philadelphia Polyclinic Medical Society.

By THOMAS J. MAYS, M.D.

[Read September 9, 1891.]

The subject of the action of sweet oil in the treatment of biliary colic and catarrh of the hepatic passages has recently been warmly discussed. There are many who regard this agent as being very much overrated, while many others believe that it has a very beneficial influence on this disease. In view of the divided opinions on, and the importance of, this matter, the Therapeutic Section of the Philadelphia Polyclinic Medical Society has, as a part of its scientific work, undertaken a special collective investigation concerning the clinical value of this drug in gall-stone colic. With this end in view, the undersigned committee was appointed, and directed to send a number of circulars to the members of the profession, of which the following is a copy:

"Sex and age of patient? Seat of pain? Jaundice? Previous attacks? Did you test any other remedy, and with what results? Result of treatment with olive oil. Remarks."

To these circulars nineteen replies were received, and thirty-seven cases of gall-stone colic treated with olive oil were reported. To these members of the profession the warmest thanks of this committee are due for the promptitude with which they responded. Additionally the committee imposed the task upon itself to collect as far as possible all the previously reported cases of biliary colic which were treated according to this method, and succeeded in gathering records of seventeen cases, making altogether a list of fifty-four cases, a condensed history of which is presented in the following table:

TABLE OF CASES.

No.	Sex and age.	Seat of pain.	Jaundice.	Previous attacks.	Use of other remedies, and results obtained.	Results obtained from the use of sweet oil.	Remarks.	Name and address of observer.
1	F. 40	Right hypochondrium.	Yes	Three or four.	None.	Six ounces taken in three hours. Relief in twenty-four hours.	No recurrence for more than three years, up to time of report.	H. T. Bahnson, Salem, N.C.
2	M. 50	Right hypochondrium.	Yes	A great many.	Antipyrin hypodermically, with temporary relief.	One pint taken in two hours; complete relief.	No return for more than two years.	H. T. Bahnson, Salem, N.C.
3	F. 65	Right hypochondrium.	Yes	Five or six.	None.	Half a pint taken in four hours; relief in 12 hours.	No return for more than three years. In two other cases the single large dose produced relief, but failed to prevent a recurrence of attacks.	H. T. Bahnson, Salem, N.C.
4	M. 46	Right hypochondrium.	Yes	Three.	Chelidonium and dioscorea gave some relief.	Quantity of oil given not stated. Remained well so long as he took it.	Used it in other cases of biliary troubles, and with good success.	G. R. Fortiner, Camden, N.J.
5	M. 34	Right hypochondrium.	Yes	No.	Chelidonium without relief.	Quantity of oil given not stated. Administered it for ten days, when patient died.	*Post-mortem* investigation showed complete adhesive obstruction of bile ducts. Patient received a blow in hepatic region some time before.	G. R. Fortiner, Camden, N.J.
6	F. 28	Gastric region.	Yes	Eight or ten.	Sodium phosphate without benefit.	One pint at a single dose. Complete relief.	No recurrence within a year.	J. J. Cox, High Point, N. C.
7	F. 49	Epigastrium	Yes	Six.	Sodium phosphate with some benefit.	Took the oil for four weeks. Dose not stated.	No recurrence; general condition much improved.	G. H. Franklin, Hightstown, N. J.
8	M. 67	Epigastrium	Yes	Twelve.	Sodium phosphate, after which a severe attack became less frequent.	Continued oil for six weeks. Dose not given.	No recurrence; improvement after oil surprising.	G. H. Franklin, Hightstown, N. J.
9	M. 45	Right hypochondrium.	No	One a week for three months	None.	Took the oil for four weeks. Dose not given.	One light attack since he began the oil.	G. H. Franklin, Hightstown, N. J.
10	F. 31	Right hypochondrium.	Yes	Once every 3 weeks during 14 years	Morphine and anæsthetics; temporary abatement.	Dose of oil not stated. Free from attacks for eleven months.	Her previous sufferings were intense, requiring large doses of narcotics.	A. B. Gloninger Lebanon, Pa.
11	F. 35	Right hypochondrium.	Yes	Uncertain.	None.	Dessertspoonful of oil every three hours. Relieved after second dose.	History of malaria; liver and spleen enlarged.	E. Lawney, Denver, Col.
12	M. 10	Right hypochondrium	Yes	One 5 years before.	None.	Dessertspoonful of oil. Pain relieved at once.	Also gave ammon. chloride, gr. iij., and calomel $\frac{1}{32}$gr. t. i. d.	E. Lawney, Denver, Col.
13	F. 51	Hepatic and gastric region	Yes	No.	Yes; nature of same not mentioned.	Daily for two days gave 8 oz. of oil; no relief.	Patient died.	E P. Bernardy, Philadelphia.
14	F. 72	Region of gall-bladder	Yes	No.	Yes; nature of same not mentioned; no benefit.	Nine ounces of oil for ten days without positive improvement.	Oil caused numerous alvine discharges, lightened the color of skin, and seemed to reduce size of gall-bladder.	E P. Bernardy, Philadelphia.
15	M 40	Right hypochondrium.	Yes	Several, but none for 5 years.	Dioscorea, morphine, and atropine, with some relief.	Dessertspoonful every half hour with the most marked relief.	Regulated diet, and gave sodium phosphate, etc.	Theo. G Davis, Bridgeton, N. J.

No.	Sex and age.	Seat of pain	Jaundice.	Previous attacks.	Use of other remedies, and results obtained.	Results obtained from the use of sweet oil.	Remarks.	Name and address of observer.
16	F. 30	Over abdomen.	Yes	One, possibly two.	Calomel, sod. bicarb and morphine, slight relief.	Dessertspoonful of oil every three hours; complete relief after second dose.	Stools contained concretions.	E. H. Bidwell, Vineland, N. J.
17	F. 55	Right hypogastrium.	Yes	Yes.	Morphine and atropine hypodermically, with what results not stated.	Gave six ounces of oil, and relief came in an hour. Following day slight attack; ten ounces. No recurrence.	The intense vomiting from which she suffered ceased after the oil was taken.	Ch. Pottberg, Philadelphia.
18	M. 40	Right hypochondrium.	Yes	Several.	Silver nitrate, regulation of diet and water with good results.	Dose of oil not stated. Negative results.	Examination of feces after oil showed contents of soapy concretions.	J. Daland.
19	M. 50	Right side of abdomen.	Yes	At least two.	Chloroform inhalation and sodium bromide; did not obtain decided relief until oil was taken.	Relieved after taking three doses (size not stated) of oil.	The oil appeared to relieve him, but he may also have been helped by the chloroform.	
20	M. 46	Over gall-bladder on pressure.	Yes	Two.	Not stated.	Ten hours after taking one quart of oil in divided doses, two large gall-stones discharged in the stools. Steady improvement.	Bowels had not been moved for four days before the oil was taken. Singultus existed for twelve hours before bowels moved.	A. F Magruder U. S. N, Wash., D.C.
21	M. 52	Over gall-bladder.	Yes	For y'rs at intervals of from 4 to 6 mos.	Nature of not stated; temporary relief.	Half-ounce doses of oil every five h'rs for about a month before report was made.	Too early to judge the effects of oil. General health better than for two months.	J. D. Dewitt.
22	F 40	Right hypochondrium.	Yes	One about 2 months before.	Morphine, quinine, atropine, calomel, etc. Not the prompt relief obtained with the oil.	Dessertspoonful of oil every four hours. Improvement at once.	No recurrence so far as known. Gall-bladder diminished in size.	Thos. J Mays, Philadelphia.
23	F. 45	Right hypochondrium	Yes	Periodically for a number of years.	Morphine and atropine hypodermically gave slight temporary relief.	Dessertspoonful of oil every three hours, with decided relief.	No attack since so far as known.	Thos J. Mays, Philadelphia.
24	M. 20	Not known.	Yes	During previous 3 months.	No.	Dessertspoonful of oil three times a day with prompt relief.	No return so far as can be learned.	Thos J. Mays, Philadelphia.
25	M. 27	Right hypochondrium.	Yes	Periodical during previous year.	Not by observer.	Dessertspoonful of oil four times a day with gradual relief.	No recurrence.	Thos. J. Mays, Philadelphia.
26	M. 67	Right hypochondrium.	No	No.	None used.	Dose of oil not given. Complete relief.	Hard concretions like gall-stones passed freely for ten days after taking the oil.	C R. Early, Ridgway, Pa.
27	F. 35	Right hypochondrium.	Yes	Very frequent.	Morphine, mercury, and potassium iodide; good results	Dose of oil not stated. Good results.	Perfectly well in three or four weeks after taking the oil.	C. R. Early, Ridgway, Pa.
28	M. 23	Right hypochondrium.	Yes	Yes.	Potassium chlorate, sodium bicarbonate, and ipecac.; good results	Dose of oil not stated. Cured in two weeks.	No recurrence for three years.	C R. Early. Ridgway, Pa.
29	F. 50	Right hypochondrium.	Yes	Yes.	None by observer, but by other physicians.	Dose of oil not stated. Found relief in two days	No recurrence; treated forty years ago. Treated many similar cases during this time.	C. R. Early, Ridgway, Pa.

No.	Sex and age.	Seat of pain.	Jaundice.	Previous attacks.	Use of other remedies, and results obtained.	Results obtained from the use of sweet oil.	Remarks.	Name and address of observer.
30	F. 54	Right hypochondrium.	Yes	Quite a number.	Of everything else he tested chloroform seemed to give the best results; relief temporary.	Six ounces of oil in two equally divided doses, half an hour apart. Gave oil at three different times. No symptoms for two years.	Passed a large number of calculi. Enforces a rigid dietary in all these cases. Allows no sugar, starchy or fatty food.	D. P. Boyer, Philadelphia.
31	M. 60	Right hypochondrium.	Yes	A number during 3 previous years.	Sodium phosphate, chloroform, morphine, and succinic acid; no satisfactory results.	Same dose as in previous case. Relieved two attacks two months apart.	No recurrence since second attack, which occurred a year and a a half ago.	D. P. Boyer, Philadelphia.
32	F. 22	Right hypochondrium.	Yes	Two.	Sodium phosphate, morphine, mineral water, etc., seemed to relieve first, but not second attack.	Only received the oil for two days, when she was entirely relieved. Passed a number of calculi.	Treated about ten cases with the oil, and in all there was either a cure or benefit.	D. P. Boyer, Philadelphia.
33	M. 42	Right hypochondrium and in epigastrium.	Yes	None.	Tested numerous chologogues without benefit.	Six ounces of oil at night, followed next morning with laxative; relief.	Discharge of biliary calculi. No recurrence.	Ed. R. Mayer, Wilkesbarre, Pa.
34	F. 40	Right hypochondrium.	Yes	About two a year for 15 years	Not by observer.	Six ounces of the oil gave prompt relief. This was the last attack the patient had.	Insists on a rigid dietary. Chologogues, Carlsbad water, etc., as preventives.	Ed. R. Mayer, Wilkesbarre, Pa.
35	M. 58	Right hypochondrium and right shoulder.	Yes	No.	Not by observer.	Same dose of oil in the evening and purgative in the morning. Complete relief after fourth dose. No recurrence.	Gall bladder was so distended with calculi that it could easily be mapped out. Treated about 35 cases of gall stones during last 14 yrs with olive oil, and in every instance the severity of the attack was mitigated by the first and entirely relieved by third or fourth dose.	Ed. R. Mayer, Wilkesbarre, Pa.
36	F. 42	Right hypochondrium and back.	Yes	Suffered for 10 years off and on.	Sodium phosphate gave temporary but no permanent relief like the oil.	Tablespoonful of oil every three hours for about one month; after an interval gave it again, but less frequently. Pain ceased at once after oil was administered	No recurrence; Passed a calculus in feces weighing 40 grs.	J. S. Baer. Camden, N. J.
37	M. 68	Epigastrium and right hypochondrium.	Yes	Two.	Opium and ether only gave temporary relief.	Dessertspoonful doses of the oil gave prompt and decided relief.	No recurrence.	H. C Bloom, Philadelphia.
38	F. 42	Region of gall-bladder	Yes	Yes.	Morphine hypodermically and by the mouth; ether inhalation and hot poultices, without relief.	Half an hour after swallowing from half to three-fourths of a pint of oil the pain ceased abruptly.	First three passages after oil contained two gall-stones; has had two slight attacks since which did not require medical interference.	D. D. Stewart, Med. News, Nov. 23, 1889.
39	F. 45	Right hypochondrium	Yes	Yes, for 12 years.	Morphine and atropine hypodermically; hot water, etc.; relief for two hours, when pain returned as severely as before; morphine gave no relief.	Forty-five minutes after being able to retain five ounces of *cotton-seed* oil, pain diminished, and ceased three hours later.	Subsequent attack also relieved by the oil. Fifth day after last attack passed a calculus as large as a beech-nut.	D. D. Stewart, Med. News, Nov. 23, 1889.

No.	Sex and age.	Seat of pain.	Jaundice.	Previous attacks.	Use of other remedies, and results obtained.	Results obtained from the use of sweet oil.	Remarks.	Name and address of observer.
40	F. elderly.	.....	Yes	For some years.	Usual remedies, without relief.	Six ounces of oil at bedtime, followed by castor oil next morning. Passage of gall-stones. Relief.	In two days another paroxysm of pain was threatened. Ordered oil the two following nights. Saw her four months after. No recurrence.	R. Kennedy, Kingston, Can., Lancet, 1890, vol. ii. p. 456.
41	F. adult.	.....	...	For years.	Not stated.	Full doses of oil for two consecutive days. No return.	Passed a large number of calculi. Relieved two other cases of gall-stone colic with the oil.	R. Kennedy, Kingston, Can., Lancet, 1890, vol. ii., p. 456.
42	F. 40	.....	...	Yes.	Treated by other physicians without relief.	Eight ounces of oil at bedtime, and following morning after last a dose of castor oil. Relief.	Evacuated several small gall-stones.	Dr Gay, Buffalo. Buff. Med and Surg. Journ., vol. vi, p. 214, 1866–67.
43	M. adult.	.....	...	Third attack.	Morphine hypodermically to allay pain.	Eight ounces of oil night and morning, followed by a dose of podophyllin. Relief.	Says that olive oil is as much a specific in gall-stone colic as sulphur is in scabies.	Dr. Gay, Buffalo, Buff. Med and Surg. Journ., vol. vi p. 214, 1866–67.
44	F. adult.	Pain in epigastrium.	Yes	Yes.	Was treated for scirrhus of the liver by other physicians. Received 60 drops of McMunn's elixir of opium with only temporary benefit.	Eight ounces of oil for two consecutive nights. Evacuated calculi. Relief.	Success in this case led him to use it in another which is not fully described.	Ira Hatch, Chicago, Ill., Chicago Med. Examiner, 1867, vol. viii. p. 469.
45	... adult.	.....	...	At least one attack before.	One-eighth gr. doses of calomel; bowels moved; no relief; patient vomited everything.	Two pints of oil in divided doses. Relief. The oil was the only thing which would remain in stomach.	An operation had been suggested, but with the improvement it was abandoned	F. W. Langdon, Cin. Lancet, Clinic., 1890, p. 191.
46	F. 36	Liver enlarged and sensitive; gall-bladder enlarged.	...	Almost daily for 5 years.	Obtained no relief from other treatment.	Large doses of oil for two weeks. Relief.	Free from atttacks for 18 months. up to the time report is made. Passed hard concretions.	S. Rosenberg, Therapeut. Monatshefte, Dec. 1889, vol. iii
47	F. 37	In hepatic region; enlarged liver.	Yes	At least for 5 months, attacks occurr'd during menstrual periods.	Cathartics and other agents brought no relief.	Twenty-four hours after the first large dose of oil pain disappeared, and in a few days the liver diminished in size.	About two months after this attack there was a slight return checked with one dose. No recurrence and a general improvement.	S. Rosenberg, Ibid.
48	F. 38	.....	...	For 9 years; latterly once a week	Mineral-water cure without benefit.	Large doses of oil relieved her, excepting a slight soreness in region of liver which was cured with 15 grs. sodium salicylate three times a day.	Passed a biliary calculus. Free from pain to time of the report—about one year.	S. Rosenberg, Ibid.
49	F. 48	In region of gall-bladder	Yes	Several attacks.	.....	Large doses of oil followed by two passages and relief within twenty-four hours.	Passed large number of concretions. The attack occurred with each menstrual period for some time before she took the oil.	MM. Chauffard et Dupré Société Médicale des Hôp. de Paris, tom. v., 1888.
50	F. 62	.....	Yes	For 12 years.	.....	Large dose relieved her for eight days, but the final results are of a doubtful character.	.....	MM. Chauffard et Dupré, Ibid.

No.	Sex and age.	Seat of pain.	Jaundice.	Previous attacks.	Use of other remedies, and results obtained.	Results obtained from the use of sweet oil.	Remarks.	Name and address of observer.
51	F. 50	.....	Yes	For a number of years.	.....	Large doses of oil were followed by local and general improvement.	.....	MM. Chauffard et Dupré, Ibid.
52	F. 45	In hepatic region.	Yes	At least three attacks.	.....	Large doses of oil followed by beneficial results.	The pain in the hepatic region disappeared, and the colic was cured.	MM. Chauffard et Dupré, Ibid.
53	F. 58	In hepatic region.	Yes	A number of attacks.	.....	Large doses of oil followed by relief.	Passed a large number of concretions. Pain and swelling in liver disappeared.	MM. Chauffard et Dupré, Ibid.
54	F. 43	In hepatic region.	Yes	Six attacks.	....	Large doses of oil followed by relief.	The attacks of biliary colic were associated with nephritic colic, and with the discharge of a urinary calculus, biliary calculi passed at the same time.	MM. Chauffard et Dupré, Ibid.

An analysis of these fifty-four cases shows that there were about one-third more females than males who suffered from gall-stone colic; that two died, that in three negative results were obtained, and that in fifty, or in 98 per cent., positive relief was afforded. These results make a better showing still, when we consider that one of those who died was suffering from adhesive obstruction of the bile-ducts—a disease which no procedure, either medical or surgical, could have remedied. Nor do these figures give us a true estimate of the favorable action of olive oil in this disease; for two of the observers state that they have treated forty other cases of biliary colic without a failure, but of which they had kept no record—making in all a collective return of eighty-nine cases—showing the great value of this drug.

These cases illustrate, then, the positive efficaciousness of sweet oil in the treatment of gall-stone colic, and the question naturally arises, therefore, as to the manner in which this agent acts. Dr. Rosenberg's experiments ("Ueber die Anwendung des Olivenöls bei der Behandlung der Gallensteinkrankheit," *Therapeutische Monatshefte*, December, 1889, S. 542) demonstrate beyond a doubt that it largely increases the quantity of bile secreted, while at the same time it diminishes its consistency. But how does it accomplish this? Does is stimulate the biliary channels by coming in contact with their openings into the alimentary canal? Or is it decomposed into fatty acids and glycerin through the instrumentality of the pancreatic juice, and does the "glycerin so liberated exert in the duodenum an action similar to that which takes place when it is introduced into the

rectum," causing a powerful reflex peristalsis—an ingenious theory suggested by Dr. D. D. Stewart?[1] Or does it act in accordance with the hypothesis formulated by Virchow, who shows from his own experiments (*Therapeutische Monatshefte*, 1890, S. 86) that it is absorbed from the alimentary canal, is excreted by the liver, and is thrown into the bowels again through the biliary passages? The last of these theories appears to be most rational, because it explains certain well-known features in its action, and also places it on a level with the action of other cholagogues. We may conceive then that the beneficial influence of oil consists not so much in dissolving the biliary concrements, as it does in increasing the biliary excretion, in flushing, and in lubricating and washing out the passages of the liver.

Another point of interest in this collection is as to the proper dose of the oil. Are the large doses necessary which were administered to most of the cases in this collection? It appears not; for eight of the cases (Nos. 11, 12, 15, 16, 22, 23, 24, and 25) received only dessert-spoonful doses every three or four hours, and apparently with the same prompt and positive relief as that which was afforded by doses of from five ounces to one and two pints. If this should be confirmed by further experience it would be a great practical gain in view of the fact that a great many persons show a strong aversion to all kinds of oil, especially if they are to be taken in large quantities.

Furthermore, according to the observation of Dr. Stewart (Case 37), it does not appear to make any difference whether olive or cotton-seed oil is used. Indeed it is well known that much of the oil which is sold as olive is in reality refined cotton-seed oil; and Dr. Stewart's observation tends to show that in all probability any bland oil will have the same effect on the disease under consideration.

In conclusion, the committee desires to congratulate the Polyclinic Medical Society on the selection of a subject for collective investigation which has proven so fruitful of practical results as that which is embodied in this report; and expresses the hope that it may continue its good work of testing therapeutic agents in a clinical way. It is true that animal experimentation often points out the path in which the usefulness of a drug lies, but clinical and collective research is after all the crucial and final test of all true therapeutic progress.

THOMAS J. MAYS, M.D.,
HOMER C. BLOOM, M.D.,
Committee.

[1] "A Suggestion as to the Action of Olive or Cotton-seed Oil in Gall-stone Colic." By Dr. D. D. Stewart. Medical News, November 23, 1889.

DISCUSSION.

DR. WILLIAM S. STEWART: I wish to show the Society a stone which was obtained this summer from a lady between seventy and eighty years of age. She had suffered with periodical attacks affecting the bowels and passing off with simple treatment. On the last occasion she suffered excruciating pain in the region of the cæcum and I was sent for. Thinking there might be some inflammatory affection in this region and that possibly abdominal section would be necessary, and finding a mass in the right iliac region, I placed her in the knee-chest position and gave her a very large injection. After as much as possible had been injected, I had her sit on a jar. Not experiencing relief, I continued the injections while she was in this position, using flaxseed tea. This was continued for five or ten minutes. She was then put to bed and another large injection given. I then left her, and shortly afterward she got up and this huge gall-stone was passed. (About the size of a hen's egg.)

Some twenty-five years ago my attention was directed to the method of treatment by olive oil by a lady from California. I had seen her some time before in a debilitated condition from frequent attacks of biliary colic. I inquired the cause of the improvement, and she told me that she went with a friend to see a quack, who at once told her that she had gall-stones, and directed her to take half a pint of sweet oil in the evening and to rub the right side frequently during the night, telling her that when her bowels were opened she would pass many gall-stones. It happened just as he said, and she had entire relief. Since then I have taken advantage of this hint.

I use the spirits of chloroform in combination with olive oil during the period of attack, and recommend that the oil be continued in doses of two tablespoonfuls before each meal, for a period of several weeks afterward. In this connection I recall to mind an amusing occurrence that happened in the army. A soldier was suddenly taken with biliary colic, and the assistant surgeon, an ignorant man, who had been promoted from the position of hospital steward, was called. He at once prepared a dose of chloroform, and taking it to the patient said: "Take this; it may do you good or it may kill you. Try it."

DR. JOHN C. DA COSTA: My results with olive oil have not been so brilliant nor so quick as those reported in the paper. Opiates and chloroform will relieve the pain, but phosphate of soda does not seem to act as well as reported. Calomel between the attacks acts well; corrosive sublimate still better. One case will illustrate what I have to say. A hysterical woman has had at least five or six attacks in two years. I was disposed to think that all the attacks were not due to gall-stones until she brought me the stones which she had just passed. She was treated with olive oil in half-pint doses. Since then she has had four or five attacks. In the last two she did not consult me until they were over. She takes half a pint to a pint of olive oil at one dose and lies down. In twelve or fourteen hours (not two or three as in some of the reported cases) she is relieved. The oil seems rather to lengthen the interval between the attacks.

DR. M. PRICE: The committee deserve great credit for its thorough investigation, but I cannot see the brilliant results referred to. In my experience I have not found the spasm of biliary colic to last many hours. How olive oil can relieve the pain, unless it is by a lubricating process, I cannot understand. Many stones are of a soft non-irritating nature, and if the spasm in the gall-duct is relieved there is no trouble; the stone passes readily except when the duct is inflamed. Within a month I have seen two post-mortems. In one, a man, there were found two hundred and fifty gall-stones in the bladder. The man had never had an attack. In the other, that of an old lady with cancer of the kidney and a stone in the kidney, the gall-bladder contained five or six ounces of grumous fluid and a number of soft gelatinous stones. She had never had any symptoms referable to the gall-bladder. There is another form of stone in which the treatment could be of no benefit, and that is in those hard ones which we see in cancer, and which in many cases, I think, are the cause of cancer of the liver. Where the stone is large and produces constant irritation there can be no possible benefit from any treatment except tremendous doses of morphia. The stones which I show you are hard and were removed by section.

The history of the cases reported is of this character. You prescribe a remedy to which the patient submits and endures the pain until the spasmodic period of the disease passes. Chloroform and morphia during the continuance of the spasm seems to be the only rational treatment.

In this whole series of cases has there been a post-mortem? It is very difficult to say when you have a patient suffering with spasmodic pain in the region of the gall-bladder that it is due to gall-stones. Four or five years ago I saw a travelling minstrel who had had attack after attack, and had been treated by the best surgeons in the country for gall-stones. He had received olive oil and many other methods of treatment. I said to him there was no use of doing anything until we found out what was in the gall-bladder. I operated, and after breaking up adhesions reached the gall-bladder and found it perfectly healthy. The patient was completely relieved. His symptoms had simulated gall-stones so much that many surgeons wanted to open him for gall-stones.

In regard to cases of obstruction of the gall-duct.[1] There are cases simulating gall-stones which are not relieved by medical treatment, but which could be relieved without trouble by abdominal section. It has been suggested by one of the best surgeons in this country to open the abdominal cavity and drain the gall-bladder, then to take a rubber ligature and unite the duodenum or ileum to the gall-bladder, and then with a whipped suture unite the peritoneum of the bowel to the peritoneum of the gall-bladder. In the course of three or four days a fistula forms and then the abdominal opening can be closed with silkworm sutures previously introduced. There is no question that gall-stones of the size that I have shown should be removed. It is my firm belief that gall-stones of this hard, irritating nature may in time produce malignant disease of the gall-bladder or of the gall-duct.

I think with Dr. Mays, that the explanation of the benefit of olive oil, if it

[1] In the doctor's report of the case of stricture of the gall-duct, with death, the post-mortem found no stone; in this case it was stricture, and not stone, under treatment.

exerts any, is to be found in the lubricating and stimulating qualities of the oil, and that it relieves spasm simply by its purgative effect. I cannot see where the benefit can come in. It has no solvent effect, and it cannot remove a stone whose diameter is ten times that of the gall-duct.

DR. JAMES B. WALKER: In my experience, the question is not so much what will relieve the attack, as what will prevent its recurrence. If one would send out a series of questions in regard to the usefulness of any particular agent in gall-stones, would he not receive replies very similar to those given to-night? Take calomel, or any other agent which acts as a laxative, and it will terminate an attack of gall-stones, if it is a terminable attack. The question is, What will prevent recurrence? So far as this report goes, it seems to give to olive oil a favorable position as an agent for preventing recurrence. This is the most favorable report that I have seen. Still these are not exceptional results. We meet with cases of gall-stones where the attack is never repeated. Unquestionably, in many cases the recurrences are due to the number of gall-stones. Sometimes, however, the attack terminates without the discharge of the stone, and yet there is no recurrence for months. I have a patient who recently passed a calculus, resembling a mulberry both in shape and appearance; he passed this after a number of attacks under my observation. The attacks were treated with morphia and calomel, followed by phosphate of sodium and nitro-muriatic acid. After each attack there would be a return to health for a period. In at least ten attacks, the feces were examined without result. At times a detritus was found, looking like a crumbled stone. This was found in the last attack, and it was thought that the stone had crumbled and passed; however, the following day another severe attack occurred, in which blood was passed, and in the centre of a clot of blood was found the calculus as large as the last joint of the index finger, and without facets. This was, unquestionably the cause of all the trouble.

I believe that any laxative agent which will promote peristalsis and free biliary discharge will relieve the immediate attack if the stone can escape; then some agent to relieve the catarrh of the duodenum and the hepatic catarrh will be required. I have used olive oil in several cases, but my experience has not been satisfactory. The case just referred to received six ounces of olive oil on two occasions without benefit; other patients have received equal doses without success. The best remedy that I have found for old, recurring cases, where there seems to be an impacted stone, and where even cancer has been suspected, from the cachexia, is spirits of chloroform. In two cases, sisters, seen at intervals of five years, this seemed to be the agent that turned the tide of events after repeated efforts with other remedies. I gave it in teaspoonful doses three times a day. The cases immediately changed their character, the jaundice disappeared, and improvement in the general health took place. I believe the chloroform, which is known to increase the liquefaction of the bile, is of value in these cases; this, with phosphate of sodium, or some other sodium salt, or, where the patient is wealthy enough, a visit to the Carlsbad Springs. Here the waters are taken with a strict dietary for three weeks; when the patient is emaciated to a certain degree, he is sent to some other place for recuperation, to return for three successive years. This will often effect a cure. I have a patient who has been benefited by this course. After her return from the first visit to Carlsbad she had three attacks during

the year; after the second she had two, and her general health was excellent. She is now returning from her third visit.

Dr. Streets, of the navy, has mentioned to me an interesting case where he used olive oil. The patient, a sailor, was seized with an attack of gall-stones, and was at once put upon the use of olive oil. The discharges were saved, and there were obtained a number of soft, pulpy bodies, which had a very odd appearance. They were somewhat globular, and not faceted. These were placed on a surface so that the oil could be absorbed, and they shrunk in size, showing them to be faceted gall-stones. It seemed as though the oil had penetrated these in some way, either before or after leaving the biliary duct. They were unquestionably gall-stones.

DR. A. B. HIRSH: There is possibly one class of cases in which exception might be taken to Dr. Price's remarks in regard to having a remedy that would obviate future attacks, that is, those cases of distortion of the anatomy of the parts where no operation would avail. In the majority of cases of cholecystotomy we allow for drainage for some time, in the hope that the habit of inspissation of bile may be overcome. Those cases in which peritonitis is associated with resulting obstructive bands, and where, after closure of the fistula the symptoms recur, are not satisfactory ones to deal with. I have met with several such cases, and in these any remedy that offers a promise even of relief should be welcomed.

In regard to the cases reported by practitioners who see but few, and then only at long intervals, there often remains some doubt as to the correctness of their diagnoses. Dr. Porter published in the St. Louis *Weekly Medical Review*, in the spring of 1889, a paper in which he analyzed a large number of such cases reported of supposed relief of gall-stones by the use of olive oil; he appeared to show that the treatment had no scientific basis; that the cases had not been followed sufficiently long, and that, if anything, the observers had been careless in taking notes.

DR. MAYS: I am here, perhaps, as the innocent champion of olive oil in the treatment of this disease. Having had some very favorable results from its action in three cases of gall-stones, I proposed the subject to the Polyclinic Medical Society for further investigation. From my own experience with it, I think that we ought to be very careful and not make any dogmatic statements concerning the action of this oil. Even if we do not know how an agent acts, we are warranted in ascribing some usefulness to it if it does the work which was intended it should perform, and especially if we were unable to accomplish this with anything else. I believe the cholagogue action of olive oil has been denied this evening, and in answer to this I would say that Rosenberg's experiments, which show its powerful influence on the biliary secretion, have been before the profession for at least a year and a half. Rutherford found that sodium salicylate was one of the best cholagogues, but the former demonstrated that the olive oil excelled the latter agent as a biliary stimulant. In view of this influence it is easy to see how it acts in this disease, and it is also easy to see how the sodium salicylate acts beneficially in similar cases.

Dr. Price seems inclined to doubt that the concretions which are evacuated after the oil is administered are true gall-stones. This is, of course, difficult to determine in many of the cases which are reported, but at least in one

instance (Dr. D. D. Stewart's case) the concretions were examined by Dr. Leffmann, and by him pronounced true gall-stones.

I can hardly agree with the opinion of Dr. Walker that the sending out of inquiries concerning the action of any agent in biliary colic would have brought similar favorable replies. There is too much unanimity, I may say, in the reports favorable to the action of the oil to give the least countenance to such a belief. Besides, we endeavored to guard against this very uncertainty. The circular asked expressly whether any other agents had been given, and with what results. In the great majority of cases all the known remedies had been tried, with doubtful results, or with failures. Many observers stated that no agents had given such signal relief as sweet oil.

If we believe in the efficacy of cholagogues to relieve the attacks of biliary colic, and are in search of an agent having a similar action to prevent their recurrence, then I think it is useless to advocate the action of chloroform in this disease, as has been done to-night. So far as I know, chloroform is not a cholagogue, but may act by relieving the spasm of the gall-ducts, and by having a solvent action on the calculi. I can more readily see how olive oil would prevent such recurrence, since it is one of the best stimulants to the hepatic secretion that we possess.

THE OPERATIVE TREATMENT OF APPENDICITIS.

By THOMAS S. K. MORTON, M.D.

[Special Meeting, September 28, 1891.]

Mr. President, Ladies, and Gentlemen: Since being requested by the directors a few days since to open the discussion of the Operative Treatment of Appendicitis, I have taken a glance through the literature of the subject in order to offer, as it were, a concensus of opinion regarding the present status of the subject, as well as to draw conclusions from such personal experience as has fallen to my lot in this direction. Now I find myself embarrassed by the necessity of limiting my remarks to the few moments which are at my disposal and to crowd into them even bare mention of the most salient facts. Hence much must be entirely omitted and other points given scant attention.

The discussion being limited to operative treatment, pathology and diagnosis—perhaps the most interesting branches of the subject even to surgeons—are not to be touched upon except incidentally. But I cannot refrain in passing from saying that as the ratio of appendicular to cæcal inflammatory affections is probably 100 to 1, hence that *differential* diagnosis in diseases of this region, which is usually impossible prior to surgical interference, is neither necessary nor important, as operative procedures up to the point of establishing diagnosis are identical for all affections of the cæcal region. Again, I would condemn without qualification needle explorations as an aid to diagnosis. The procedure is inherently dangerous, and will furnish no indication that cannot otherwise be obtained.

The number of cases of appendicular disease discovered when we are upon the outlook for them is astonishing. A large proportion of peritonitis cases in males, and especially in children, arise from this disorder; and in all cases presenting abdominal pain, whether acute, chronic, or recurring, no matter where referred, we should think of and examine for possible appendicitis. I have come to be

very skeptical of such conditions as are described as abdominal "cramps," "colic," etc., particularly when of frequent recurrence. Curious as it may appear, yet it is a fact that the great majority of the profession are only now beginning to recognize cases of appendicitis and its consequences as such. Formerly the affection was almost universally diagnosed as anything else except itself. But just in proportion as the disease continues to be more certainly recognized, so surgeons are more early operating upon cases which demand interference, and, as a consequence, the mortality from the disease, as well as from the operation, is very rapidly on the decline.

Keen has said that "the first indication in appendicitis is to call a surgeon," that the physician, who almost invariably first sees the case, and the surgeon may together watch the case, and if operation becomes necessary, interference may be prompt and well timed; while the surgeon will have the great advantage of being already familiar with the case and not disposed to delay the operation that he may acquire such familiarity. Again Mynter has well said that "we are utterly unable to judge correctly from symptoms alone of the extent and severity of appendix lesions, and for this reason alone abdominal section is and must be the safest method of treatment" in many cases.

When shall we operate? Judging from the cases that I have observed and from the writings of others, I would formulate as a good working rule: To operate not later than the third day of disease, if the patient up to that time has failed to markedly improve under rest, restricted diet, purgation, and topical applications. Especially should this rule be adhered to in cases where we have failed to move the bowels—these are apt to be the fatal ones. Further than this, we should invariably operate as soon as the presence of pus is assured; when peritonitis is developing or spreading; when signs of sudden rupture of an abscess into the peritoneal cavity appear; and where septicæmia from septic absorption is taking place. In children operation must often be performed earlier than in adults, as with them the malady is more speedy in development, more fatal in tendency, and shows a greater proclivity to involve the general peritoneum.

But let me emphasize the point that *pain* is not a reliable symptom (especially when opiates have been administered) from which to judge as to whether the patient is better or worse; most weight

should be given to the strength, temperature, and condition of the bowels, stomach, and general abdomen.

Mr. Treves urges that operation shall not be done until the fifth, sixth, or later day. But from my reading and experience I think this is too late. He argues thus because few deaths occur before the fourth or sixth day. These cases, however, really begin to die on the third, fourth, or fifth day, although death may not actually take place before the sixth or later day, when the possibility of benefit from operation has passed. If the case is progressing well and operation is being postponed, it should be watched and observed frequently and most carefully, for we cannot predict at what moment an appendix abscess may perforate into the peritoneum or other dangerous complication arise that will instantly demand operation.

If the case is operated upon early the chances of recovery, as a rule, are exceedingly good. The mortality of appendicitis during the first forty-eight hours is almost *nil*, and the operative death-rate at that time is equally low. Later both rates increase, but the former much more rapidly than the latter. The patient, in this disease, is generally strong and well up to the moment of seizure, at which time the danger of operation *per se* is at the minimum. Such mortality as results in operations for appendicitis has been mainly incident to undue delay. When physicians and surgeons generally have learned definitely to recognize such cases as are operative at a time before the vital forces have been too much sapped or dangerous complications have arisen, then will the mortality rate of both disease and operation remain steadily at a low figure.

Then again the local conditions from an operative standpoint are much less serious in the early stages. We have at first simply a swollen appendix with infiltration and perhaps a few adhesions. We then do not have to deal with fetid abscess, foul surroundings, and sloughing tissues which may have given rise to intestinal gangrene and other complications, as well as to the impossibility of securing primary union of the wound. Hernia is more common as a sequel in cases where the operation is performed late and where the surroundings are gangrenous and we can only secure healing by secondary intent.

The cry of every writer is for earlier operations. I have found no surgeon who regrets having operated early, but almost all mourn cases that were operated upon too late. No case appears where a mistake in diagnosis has been made, despite the awful array of affections which has been drawn up as liable to render uncertain the

recognition of appendicitis. On the other hand very many cases opened with the expectation of finding other disorders have proved to be appendicitis.

Who shall operate? The operation for appendicitis may prove to be the most easy; but it is never trivial, often trying and sometimes even baffling the skill of the very best abdominal surgeons. Hence he who undertakes operation for the removal of the appendix for disease should be equal to dealing with any of the complications and emergencies of abdominal surgery. There is scarcely a complication which occurs in abdominal disease that may not be met with in operations upon the appendix. If a man knows only how to reach the appendix, it is not enough; he must be able to cope with any accident or emergency that may arise. Therefore he must have had training in general abdominal surgery.

How shall we operate? There are two classes of cases to be dealt with. One, the acute, where there is perhaps abscess, perforation, or general peritonitis; and, second, those where operation is undertaken in the interval between acute attacks as a prophylactic measure. The indications for the latter will be considered separately further on.

The preparations for the operation are usually hurried, on account of the active nature of the disease and the sudden determination that operation has become imperative. Previous purgation, if successful, will make the chances of recovery much more bright, no matter during what stage of the disease operation is performed. Cases where the bowels have been kept open from the outset of attack are always most favorable. Locally the abdomen should be cleansed as for any other operation.

All writers now agree that the incision should be lateral. Median incision is only permissable when diagnosis from other abdominal disease is not clearly made out, as where we have had suddenly developed, violent peritonitis arise without obvious cause. Even should the median incision have been made and the affection prove to be appendicitis, especially if septic, a lateral incision should still be resorted to, for it is exceedingly difficult and dangerous to drain septic appendicitis cases through a median incision, and often it is impossible to deal with complications, or with the appendix itself, except by the more direct route. I am of the opinion that almost any complication arising from appendix or cæcal disease can best be dealt with through the lateral incision. No writer has regretted

making the lateral incision, although many have regretted entering through the linea alba.

This incision should be about three or four inches in length and terminate one inch and a half above Poupart's ligament. It should be carried down to its full extent through the right linea semilunaris until the peritoneum is reached, avoiding if possible the epigastric artery which normally would be situated to the inner side of the lower extremity of the wound. I have seen serious secondary hemorrhage from division of this artery. Having reached the peritoneum, if one does not at once get into an abscess cavity he must exercise great caution not to open the gut by mistake. Sometimes adhesions will be found binding the intestine to the peritoneum in the line of incision, and in these cases it is well to go at once to the lower or upper extremity of the wound, get into the general peritoneal cavity, and work upward or downward, as the case may be, to the cæcum, when all adhesions can be separated by the finger or knife and the peritoneum opened to the full extent of the external incision. Of course the incision should be increased in size if there is any difficulty in getting into the peritoneal cavity, or subsequently if difficulty arises in any manipulation from lack of working room. But as a rule the smaller the incision the better, because of the less risk of subsequent hernia. The head of the colon is then sought out. If now it is found difficult to determine the site of the appendix, the longitudinal muscular bands of the colon may readily be followed down to their termination in the root of the appendix. Then by careful manipulation one can usually trace the appendix, even through a mass of dense adhesions, and dissect it out. As a rule, in acute cases the organ will be found more or less free in the cavity of an abscess with its tip perhaps adherent to omentum or bowel. The appendix is to be dissected out with the finger, and often we do not see it until it is brought out of the wound ready to be ligated off. This manipulation closely corresponds to the modern one of removing the uterine appendages.

Now, what shall be done if the appendix is found to be bound down by a dense mass of adhesions, and if it would take a long dissection and endanger life from the time required to complete the operation? Under these circumstances I would advise that the appendix be left alone, rather than run any great risk of the patient's life to complete an ideal operation. We are often compelled to operate to save life, and that alone, even if we do run the risk (as in leaving the appendix) of recurrence. I do not regard the operation

as complete in any case unless the appendix is removed, and we should never hesitate to dissect out or remove the organ simply for fear of opening up the general peritoneal cavity.

Cases of recurrence of appendicitis, with great violence of symptoms, are upon record where operation had been performed and the appendix not removed. Here, again, we have a parallel with the removal of the uterine appendages. Who considers that he has done a complete operation when he simply drains a pyosalpinx? Yet there is a small (but constantly decreasing) proportion of these cases that must be so treated rather than endanger life by prolonging operation, shock, and anesthesia.

If the appendix can be excised, the question arises as to how we shall deal with it after separating all adhesions. In septic cases it will be found usually impossible to invaginate the stump, after cutting away the appendix, into the cavity of the cæcum and approximate peritoneum over the remaining opening. Where we operate between attacks the appendix, as a rule, can be dealt with in this manner and the invaginated stump retained by a few Lembert sutures approximating the surfaces of the cæcum over the aperture. When, however, the organ and its surroundings are swollen and gangrenous, the conditions are such that it is generally impossible to invaginate the stump. It has seemed quite sufficient in these septic cases to ligate the appendix a quarter of an inch from its root with strong silk, and then cut off both the appendix and the ligature ends. But ligatures will neither become absorbed nor encapsulated where septic conditions are present, and I have seen the threads coming out of the wound months afterward from a persisting sinus or by ulceration. So it occurred to me that we might resort to the old surgical procedure of leaving one end of the ligature hang out of the wound. That experiment I am now trying in a recent case. Chronic ligature sinuses assist in the production of hernia by interfering with solid union.

Frequently the appendix will be found with a mes-appendix. This should be ligated *en masse* or in sections, and cut away from the appendix. Then the appendix is ligated at its base and removed.

Removal of the appendix is almost universally recommended, but Mr. Treves has simply straightened an appendix which he found angulated by adhesions and left it in the wound. Mr. Tait has practised in more than one case splitting open the appendix and inserting a fine drain tube into it. From these instances it will be seen that there exists in some minds an almost superstitious fear of removing

the appendix. Certainly no sentiment can exist concerning the ablation of the appendix such as there is in regard to the ovaries and Fallopian tubes! Having the appendix once in hand, it does not add to the dangers of the operation in the least degree to remove it, while recurrence of the disease is thereby rendered impossible.

Occasionally the appendix is found to have sloughed off at its root, leaving a ragged opening into the cæcum. In one or two cases the edges of the opening thus left have been inverted and closed successfully by Lembert sutures. In others the wound was left entirely open and packed with gauze; an intestinal fistula or artificial anus formed, but in time closed spontaneously. Yet another required a subsequent operation and Lembert sutures before it was cured.

Some surgeons recommend that in septic cases a little flap of peritoneum be sewed across the stump, or that it be tucked under a bit of omentum. I can see no advantage in this. It prolongs the operation and does no good, while by so doing we risk the formation of a secondary abscess pocket. Very many appendix stumps have been simply dropped into the wound again after ligation; fecal fistulæ did not form and the wound closed satisfactorily.

Any portions of gangreous omentum presenting in the wound should also be ligated beyond the junction with healthy tissue and cut off.

Any small openings into the peritoneal cavity may next be sewed up carefully if the general peritoneum does not require drainage.

Then in regard to irrigation. If the general peritoneal cavity has been opened extensively, or if it is septic, it should be thoroughly washed out through the lateral incision. If it has not been involved the abscess cavity and wound alone should be irrigated. Under the latter circumstance we may employ a strong bichloride solution, but if the peritoneum is to be flushed nothing but water should be used.

If the general peritoneum has been septic or extensively opened or manipulated it is essential to use drain tubes to the base of the pelvis. The ordinary straight glass-tubes do not answer well, and rubber is not satisfactory. Here I have a collection of angulated and curved glass tubes, most of which have been used with great satisfaction in appendix cases. The angle makes it possible to get the tube to fit well over the brim of the pelvis, yet not to project awkwardly from the lateral wound. By attaching a few inches of rubber tubing to the end of the ordinary cleansing syringe the bent tube can readily be cleaned.

The suturing of the wound is especially important if the case is

not a septic one. Then the tissues should be sutured, layer by layer; this gives the best assurance of firm primary union and the avoidance of hernia. If, however, the wound is septic and drainage or packing is employed secondary union is inevitable. But I would still urge that the wound be as carefully sutured as possible in all cases, leaving ample room for exit of the drain-tube or packing. And I might say, in passing, that simple packing with strips of double cyanide or iodoform gauze will be found to answer all purposes of drainage in cases where the general peritoneum does not also require drainage.

Some surgeons advise using no stitches in septic cases, but simply packing of the entire wound with gauze. But by suturing we can usually secure primary union in a portion of even a foul wound, and temporary stitching has appeared to me to give a certain anchorage and support to the subjacent intestine, which, when the sutures are removed, is more or less retained. The stitches, of course, are to be removed, one or more at a time, when swelling, infiltration, tension, or deficient drainage become apparent. Strips of adhesive plaster should be employed to give the wound support and approximation during granulation.

Complications, such as gangrene of intestine or mesentery, must be dealt with upon general principles of abdominal surgery. If intestinal obstruction complicates the case, the site of obstruction should be ascertained, and the condition relieved, if possible, before closing the wound. Cases in which obstinate constipation has existed up to the time of operation, should be examined during its performance for possible obstruction.

Should peritonitis develop subsequent to operation, and not speedily yield to active purgation, the wound must be reopened, and the abdominal cavity irrigated thoroughly and drained. Continued obstruction could probably be best dealt with through a new median incision rather than through the original wound.

As soon as the patient comes out of ether, if the bowels have not been well emptied before operation, it is my custom to at once begin the administration of one-eighth grain doses each of calomel and podophyllin, at twenty minute intervals, until purgation is accomplished. This usually takes but a very few hours. Later salines may be employed if required.

Full strength peroxide of hydrogen solution has given me great satisfaction for cleansing and washing the wound-cavity when suppuration commences and sloughs are forming—it greatly facilitates the separation of the latter.

Persisting fecal fistulæ often close spontaneously in time. Should they not, then reopening of the parts several months later, and suturing of the cæcal or other opening with Lembert sutures is indicated, and has proved successful in several instances.

In conclusion, let me say a word in regard to operations undertaken in the interval between acute attacks, or, what may be termed—

Prophylactic Operative Treatment.

The indications for this measure are: Constantly recurring attacks (usually indicative of the presence of a foreign body in the appendix), which interfere with the individual gaining a livelihood, or render his life a constant burden, worry, and expense; also, where recurrent attacks have taken place in those, as seamen, hunters, explorers, etc., who are liable to be again attacked when they may be out of reach of adequate surgical aid. In this class of patients, operation during quiescence of the disease should be considered, and perhaps urged, by the medical attendant. In most other cases, I do not think excision of the appendix should be often attempted in the quiescent period. We should rather counsel delay until the onset of the next acute seizure, when we can conscientiously urge the removal of the offending organ at once—that is, on the first or second day. This conservative advice is given principally because of the great difficulties and dangers frequently encountered in operating during the intervals of attack when the adhesions are extremely dense. In fact, patients have died as result of the long time required to complete the operation, because of the elaborate dissection required to free the appendix from its matrix of densely organized adhesions. In several instances the very best operators have been compelled to abandon these operations in the interval of attacks, not only without having been able to remove the appendix, but also without having been able to discover the organ in its bed of adhesions.

REPORT OF CASES OF APPENDICITIS.

By JOSEPH PRICE, M.D.

[Special Meeting, September 28, 1891.]

The first case I report from memory. It occurred in Ohio eleven months ago.

Case I.—A physician telegraphed me that he had a case of appendicitis of two weeks' standing, and asked me to come at once. I wired him that I would return by way of his city in five days. He permitted the man to remain quietly in bed. I saw him at the end of the twenty-first day, leaking, with a rapid, feeble pulse, and, I think, a subnormal temperature. The patient was twenty-seven years old and previously had been a vigorous man. The abdomen was greatly distended, and there was marked fluctuation on both sides below the umbilicus. There seemed to be a perfect inflammatory diaphragm at that point. He was placed on the table and a lateral incision made, and two gallons of muddy, pussy fluid escaped. The irrigator, twelve inches long, passed its full length, extending to the left iliac fossa. Two pitchers of water were used and two large gauze drains with a glass tube between them were inserted. No stitches were used. The patient was put in bed and made a rapid recovery.

Case II.—Mrs. L., aged thirty-two years; married eleven years; no children; no miscarriage; patient of Dr. John T. Hampton. Appendicitis with perforating ulcer of cæcum; multiple pus-pockets; extensive adhesions to omentum, large and small bowel. Appendix removed. Perforating ulcer of cæcum freshened as in vesico-vaginal fistula and closed. Stump of appendix inverted. Irrigation and drainage, with speedy recovery. This patient had suffered recurring attacks, was greatly emaciated, feeble pulse, and slight elevation of temperature. She has gained over thirty pounds since the section.

Case III.—Mr. H., aged forty-two years. Operation May 5, 1891. Section for appendicitis. Pint of foul pus, fecal in odor; omentum and adherent loop ileum; irrigation, two tubes used in drainage; gauze drains. Discharged May 29, 1891.

Case IV.—Mrs. N., aged twenty-five years. Eleven weeks since confinement. Operation, July 4, 1891. Appendicitis of eleven weeks' standing. Appendix removed. Adhesions to cæcum, bladder, and uterine walls all freed. Irrigation and drainage. Patient discharged August 6, 1891.

Case V. — Mrs. S., aged thirty years; married eight years. Painful,

irregular, and profuse menstrual history; confined to her bed for the past fifteen months. Appendicitis, double pyo-salpinx. Operation, July 6, 1891. Removal of appendages and vermiform appendix; cyst of left ovary size of orange; universal adhesions separated; bowel stitched; six inches of ileum coiled and firmly adherent to uterus, bladder, and sigmoid. Left tube discharging through ileum; copious irrigation; glass and gauze drains. Discharged August 6, 1891.

CASE VI.—Miss W., aged twenty-eight years. Year previous had nephritis and cystitis; later had severe pain in right and left ovarian regions, paroxysms becoming more severe and frequent; pain at micturition and stool; catamenia gradually of shorter duration; loss of appetite and insomnia. Operation, August 20, 1891. Appendicitis and double pyo-salpinx. Cyst of left ovary size of hen's egg; cyst of right ovary size of orange; adhesions universal. Appendix, distended by concretions and two drachms of fluid, firmly adherent to ileum. Clean removal of appendix and uterine appendages; irrigation and drainage. Discharged Sept. 19, 1891.

CASE VII.—C. V., aged thirty-two years; married eight years; seven children; Polander by birth; resident Luzerne county, Pa. Last confinement, January, 1891. Acute mania, no assignable cause, probably puerperal. Indications of abdominal trouble for some time; went to bed, July 23d, with pain, tenderness in right iliac region; tympanitis. Section, August 14, 1891. Multiple pus sacs and extensive adhesions—omentum, ileum, bladder, and uterus; the pus pockets extended from cæcum to bladder. Appendix completely disorganized and floating in a puddle of pus; freeing of all adhesions; irrigation and drainage; stump of appendix inverted; stitching of ileum and cæcum at disorganized points. She did fairly well for five days; died the sixth day. Post-mortem: "Intestine in neighborhood of operation quite gangrenous; a general peritonitis. A large quantity of fetid pus in enlarged right inguinal canal, also in pocket between bladder and uterus."

Nomenclature.—The old terms were arrived at by examining old, neglected cases, often post-mortem. Recently but one term—appendicitis—is used before laparotomy, before post-mortem, because those two performances prove that so far as the gravity, intensity, and extent of the disease are concerned, the symptoms are unreliable, inadequate; further, abdominal sections and post-mortems have determined what the treatment should be—that is, surgical—under a surgeon from its inception; hence the name indicating and impressing the nature of the disease and the character of the treatment—that is, appendicitis surgicalis. Idiopathic peritonitis indicates nothing, is an empty term.

The terms typhlitis, perityphlitis, paratyphlitis, extra-peritoneal abscess of the right iliac fossa, are useless except to indicate a secondary or late process originating, without exception, in inflammation of the vermiform appendix.

Symptoms.—The most constant and valuable signs are:

1. History of sudden onset.

2. The point of greatest sensitiveness to pressure, exactly localized over the base of the appendix.

3. Fever as indicated by the thermometer varies, usually low.

4. Rigidity of right abdominal muscles, constant.

5. Constipation.

6. Œdema, overlying a deep abscess, in the right iliac fossa, in neglected cases.

7. Shock, more or less profound, usually occurs where perforation happens early and suddenly; it is followed by chill, vomit, etc.

There are no special signs of perforation if it takes place late, after adhesions have formed. If perforation occurs late and the adhesions are imperfect, we find shock.

The symptoms should be studied most carefully at the end of the first twenty-four hours.

8. Pain is misleading; often referred to epigastrium alone; to umbilical region sometimes; it is often slight.

9. Typanites is variable, it depends on state of the bowels; it indicates intestinal paresis—if it comes on rapidly it is unfavorable; it is often the result of opium.

10. Percussion not necessarily dull; there may be a tympanitic note from gas in overlying intestine.

11. Over-extension of right thigh gives pain.

12. Cough is avoided.

13. Tumor inconstant the first two days.

14. Pulse indicates severity and increase; it shows constitutional disturbance.

15. Chill and vomit inconstantly accompany the initial pain.

16. A prodromal stage of abdominal discomfort (about a week) is frequent.

17. Flexion of hip-joint not marked except in neglected cases.

The symptoms are not commensurate with the gravity, intensity, and fatality of the disease.

Diagnosis.—Early diagnosis is of the greatest importance in reference to treatment and result.

1. Find with tip of finger—using firm pressure—point of sensitiveness (exact point of greatest sensitiveness); it will be in an adult one and a half to two inches inside the right anterior superior spinous process of the ilium, on a line drawn from that process to the umbilicus

—in children, according to size—less distant from the spine of the ilium. (McBurney, confirmed by Weir and others.)

2. Rectal examination is of no value early.

3. Difficult to diagnose in the first twenty-four hours, because few symptoms present.

4. Subjective pain is of little or no value.

5. Constitutional symptoms are far inferior to local signs in forming an accurate diagnosis.

6. Have patient cough.

7. The hypodermic needle should never be used as an aid to diagnosis.

8. Medical men (physicians) no longer diagnose these cases—in the start—as simple obstruction of the bowel.

9. Diagnosis by exclusion is the only safe method.

10. The important points—after the disease has been pronounced appendicitis—is to diagnose it as an operative or a non-operative case.

Points in deciding operative or non-operative character of the case:

1. Do not operate on the first day—usually—because the number of mild cases is undoubtedly large. One operator (McBurney) saw thirteen cases, in one year, too mild for operation.

2. If nausea disappears in twelve hours; if tenderness on pressure not increased in twelve hours; if temperature normal, or not above 100° in the mouth; if pulse normal or but little accelerated; if patient moves in bed with ease;—recovery without operation probable.

Prognosis.—No positive prognosis can usually be given in the first twelve hours. If wait for "strong evidence" of perforation, abscess, general peritonitis, rapid, weak pulse, anxious respiration, distention of abdomen, though the operation is made, the patient will not recover.

Surgery has sometimes been successful even where there has been:

(*a*) General suppurative peritonitis;

(*b*) Septic paresis of the intestines;

(*c*) Multiple abscesses in the peritoneal cavity.

Such cases as these usually die, are hopeless.

Where there is no exhaustion, no general sepsis, no debility from long abstinence from food, no prolonged vomiting, the prognosis is good.

It is a serious, often a difficult, operation.

Abscess, wherever it is, and however well it may appear to be surrounded by protecting plastic deposits, is a constant menace to life,

as evidenced abundantly by its spontaneous opening into the abdominal cavity, the venous canals, the bladder, and the chest cavity, as well as externally and into the intestinal canal (Prof. Bridge).

Pus will form whether there be perforations or none: 145 autopsies had pus (Matterstock); 125 autopsies showed pus (Fenwick, quoted by Keen); 100 autopsies had pus (Weir, quoted by Keen).

Sepsis is hopeless for medicine, nearly hopeless for surgery.

Sepsis begins before the end of the third day as a rule.

Death from sepsis on the third, fourth, or fifth day is the rule.

The prognosis as to day of death, without operation, in perforative cases is one-third die between the second and fifth day.

Proof of 176 cases: 8 cases died on second day; 28 cases died in first three days; 46 cases died in first four days; 60 cases died in first five days (Fitz).

Experience shows no danger existing of infecting the healthy peritoneum in the course of an operation on the appendix.

Essentials of operative success external to the patient.—For success, the operation requires certain conditions external to the patient, namely: 1. General surgical skill; 2. Good assistants.

Time of operation.—No cases in surgery, saving, perhaps, hemorrhage from large wounded vessels, require more prompt interference —surgical (Keen).

But one out of twenty-three early laparotomies died (McBurney).

By waiting till the seventh, eighth, or ninth day to operate, a majority only, all more or less dilapidated, will have passed many dangers; not a few will be waiting the knife that they may start on the road to recovery.

Operate early (before sepsis begins), so the operation may not be an autopsy (says one of wide experience).

Not on the first day generally; at the end of thirty-six hours, if a tumor has formed, or if symptoms indicate increase in severity or extent of the disease; before thirty-six hours, if sudden perforation. If collapse or shock should be very profound, there may be need to stimulate and wait for reaction before operating.

Statistics of time of early operations: 24 cases (early laparotomies), 6 done on second day; 14 done on third day; 2 done on fourth day; 2 done at the end of one week. Result, 23 recoveries, 1 death. (McBurney.)

Definition of early operation.—"By early laparotomy is meant operation before the pathological process has reached an advanced stage. It is not measured by time; it is before (1) general septic

peritonitis has begun; (2) before pus has flowed freely into the pelvis; (3) before complete septic paresis of intestine has set in."

An early operation is done at a time when the removal of an actually diseased appendix is capable of putting an end at once to an active disease, which has already become clearly defined and which threatens life.

Origin of early operation.—"The early stage operation, or the operation for recurrence, if not of exclusively American origin, has been developed and established by American experience," is true.

Kinds of incisions.—A choice is to be made as to the kind of incision—that is, between 1, a free opening into the general peritoneal cavity, and 2, an opening limited to evacuation of the contents of an abscess without exposure of the peritoneum.

When to use the different kinds of incisions.—The free opening into the general peritoneal cavity is used, 1, in quiescent state after recurrent attacks; 2, in early stage of progressive attacks, with or without abscess or general peritonitis; 3, in later stage, when abscess has formed in one of the rarer positions and is not adherent to anterior abdominal wall.

The "limited opening" is done in later stage of affection for simple evacuation.

Sites for incision.—There is a choice of site for free incision as follows: 1, median line below umbilicus (Gerster); 2, outer margin of right rectus muscle below level of umbilicus (Sands).

There are several places at which the "limited incision" may be made; they are, 1, parallel to Poupart's ligament, about one inch above it, to above and beyond anterior spine of the ilium (Willard Parker's obligue incision); 2, through floor of iliac fossa; 3, through rectum.

When the different sites are to be chosen.—The median line is chosen as the site for the incision in cases of doubtful diagnosis for special indications. The lateral incision is generally chosen for early operations. The oblique incision is made for well-developed abscesses, mainly adherent to the anterior abdominal wall (Réclus).

Advantages of the different incisions.—The lateral incision is preferred, because 1, it lies directly over the root of the oppendix; 2, it exposes the field of operation more favorably than the median; 3, it creates a shorter, a less exposed line of drainage.

The advantages of the median incision are, 1, greater probability of not encountering adhesions between the anterior wall and the intes-

tines, in the line of incision; 2, easier access to all parts of the peritoneal cavity for washing and for drainage.

Instruments.—Of the instruments to be used, they are but those needed in other major operations.

Adhesions, limiting.—Adhesions make appendicitis a local, circumscribed disease; make it an intra-peritoneal disease generally, always. When they are absent a diffused mischief is the consequence.

Adhesions prevent resolution.—They are left by an attack that apparently ends in recovery, rendering resolution an absurd term.

Adhesions cripple organs or parts.—They may bind appendicitis to 1, parietal peritoneum; 2, omentum; 3, intestines; 4, vessels; 5, itself; 6, in short, to any or all surrounding structures.

Adhesions cause new trouble.—When slightly provoked they set up new trouble.

Adhesions cause strangulation.—They lead to strangulation of omentum, bowel, etc.

Adhesions, frequency of.—35 per cent. of all post-mortem examinations made show them (Toft).

Of 26 cases, 6 had no adhesions, 6 had slight adhesions, 6 had marked adhesions—that is to say, 76$\frac{2}{13}$ per cent. of the 26 cases had slight, medium, or marked adhesions (Weir).

Adhesions, treatment of.—Free adhesions by finger.

Treatment, by whom.—The physician shares responsibility with the surgeon as early as possible. From the inception of the disease, through the operation to the end, the surgeon and physician should not be separated; they should see the case together.

Treatment, washing.—It has been asserted that hot water is, 1, not stimulating; 2, not cleansing in irrigation; 3, its use soon followed by depression, marked; 4, its contact with the peritoneum injurious; 5, that sponging is more quickly done than irrigation; that it is impossible to cleanse hands with soap, water, brush, "rinsing" (irrigation) is ridiculous. The above statements are false.

Treatment where pus is found.—If pus is found, open pockets, wash out abscess cavities, seek appendix, tie, cut off, invert, cover with or by Lembert's sutures through the outer layer of cæcum, pack space between incision and abscess with gauze and iodoform, drain by rubber tube or rubber and glass; partly close wound, withdraw packing from between intestines on first or second day; withdraw tube and remainder of packing when circumstances indicate.

Treatment, counter-drain.—Counter-opening for drainage in flank, above crest of ilium, or through rectum, or where a sinus.

If little trouble found.—The removal of a but slightly diseased appendix cuts off the possibility of a recurrence, is a good thing.

Where nothing found, i. e., an exploratory operation.—"Exploratory operations will result in fewer deaths by far than the expectant delay which has heretofore been the general rule" (Keen).

Exploratory operation "carries with it less danger than the disease;" it has but few risks.

Treatment of stump.—To sear mucosa of stump with pure carbolic acid or Paquelin's cautery is lowering an already devitalized part.

To ligate appendix: invaginate stump, suture after Lembert, is the good way.

Site of origin.—The disease originates in the appendix (McBurney and McMurtry).

Seat of perforation.—The point of perforation is usually at the free end of the appendix; sometimes the whole part is amputated.

Perforations, frequency of.—Of 146 cases (Matterstock), 132 cases (60 per cent.) had perforations; of 129 cases (Fernwick), 113 cases (86 per cent.) had perforations; of 100 cases (Weir), 34 had perforations; 20 per cent. of Kümmel's cases had perforations.

Causes of appendicitis.—The causes of appendicitis are: 1. Irritating substance, as foods, concretions, foreign bodies. 2. Congenital stricture, occasionally. 3. Strictures at the proximal end, due to ulcerations.

Concretions, fecal, frequency of.—Of 146 cases (Matterstock), 63 had fecal concretions; of 8 cases (Stimson), 1 had fecal concretion.

Size of foreign bodies that may enter Gerlach's valve.—Foreign bodies must be small to pass Gerlach's valve and enter the appendix, thus: A cherry-pip may pass with difficulty; a plum-stone may not enter. And autopsies teach surgery.

Multiple pus cavities.—That there are frequently multiple pus cavities, proof: One case (Mikulicz) had 6 pus pockets, opened by three incisions; another of his cases had 3 pockets which were opened by incisions.

Ileo-cæcal abscesses.—They also show ileo-cæcal abscess, proof: Of 106 cases (Krafft), 84 had autopsies, 84 had ileo-cæcal abscesses.

Points at which cysts or abscesses of appendix may empty.—They prove that the abscesses or cysts do and may empty (*a*) into the abdominal cavity (*b*) into cæcum through Gerlach's valve (*c*) into rectum, (*d*) through Pettit's triangle; (*e*) above Poupart's ligament; (*f*) into ischio-rectal fossa; (*g*) into a coil of intestine; (*h*) through crural ring; (*i*) into a venous canal; (*j*) into œsophagus; (*k*) into lung.

Progress of appendicitis.—They (laparotomies and autopsies) show three distinct panoramas of progress in the disease.

Picture 1, *of progress.* (*a*) Irritating substance, catarrh of cæcum, or appendix, or both, dilatation of appendix primarily or following dilatation of cæcum, contents of bowel enter appendix, fluids are absorbed, solids are left, concretions are formed, and act as mechanical causes for inflammation, ulceration, upon which follows amelioration, or relapse, perforation, sepsis more or less extensive, operation or death.

Picture 2, *of progress.* (*b*) Irritation, catarrh of cæcum or appendix, or both, gangrene, obliteration or ulceration, stricture of proximal end during healing of ulcers, distal end patulous, retention sac or cyst forms, which inflames, which empties into cæcum, rectum, or bladder, peritoneal cavity, etc.; peritonitis arises, adhesive or local, or universal, quiescent, recurrence, connective tissue becomes involved, omentum, intestines, etc., fixed by adhesions, and possible strangulation of omentum, intestine, etc.; knife, ligature, irrigation, drain, must be used or death occurs.

Picture 3, *of progress.* (*c*) Foreign body; pressure, atrophy, necrosis of epithelium, ulceration, perforation, etc.; knife and its associates, or death.

Kinds or classes of appendicitis.—The post-mortem, the section show variations in the late or secondary process of appendiceal inflammation, which have been classified variously.

Professor With subdivides the disease as follows: 1. Peritonitis appendicitis adhesiva; 2. Peritonitis appendicitis localis; 3. Peritonitis universalis. His classification has been largely endorsed, and is recognized under slightly changed names.

Bull distinguishes between: 1. Catarrhal perityphlitis and 2, suppurative perityphlitis.

Mikulicz classifies it as 1, Diffuse septic peritonitis; 2, progressive fibro-purulent peritonitis.

Keen makes five classes, according to progress: 1. Mild form, without perforation, usually no abscesses. 2. Perforative (*a*) severe, early, fulminant; (*b*) mild early, suddenly bursts, etc. 3. Perforative, with comfortable abscess, rupturing into hollow viscus, or operated upon. 4. Abscess forming slowly, chronic—weeks, months, years. 5. Recurring.

The sum of all is (McBurney's) operative, non-operative appendicitis.

Previous attacks.—Of 106 cases (Krafft), 24 had previous attacks in 1 to 20 years; 23 per cent. had previous attacks.

Number of attacks.—One case (McBurney) had 12 attacks in one year. One case (Treves) had 14 attacks.

Frequency of the disease.—35 per cent. of all post-mortems show residua of appendicitis; 36 per cent. (over one-third) of 300 autopsies done at random, revealed diseased appendix (Toft). One case of perityphlitis to 100 of appendicitis (McBurney). Assume that one-third or more of all adults have one or more attacks (Keen).

Sex most frequently attacked.—Of 14 cases (Mynter), 1 was a woman; of 24 cases (McBurney), 21 were males, 3 females.

Age at which it most frequently occurs.—Of 72 cases (Matterstock) 2 were under two years; 10 were between two and five years; 25 were between five and ten years; 35 were between ten and fifteen years. Of 228 cases (Fitz), 173 cases were below thirty-one years; 207 cases were under forty-one years. Of 24 cases (McBurney), 24 were under thirty-six years. Of 14 cases (Mynter), 1 was under twelve years. Hence it is a disease of early life.

Results.—The operation can be done by different individuals under varying conditions, with something like uniform success; proof, the work of Sands, Stimson, Weir, Bull, Senn, Morton, Treves, Hartley, Mynter, Dalton, McBurney.

Medical and conservative mortality.—Mortality under conservative treatment is large—larger than statistics can prove—for in many fatal cases the origin is unsuspected. Proof: Fitz puts it at 26 per cent.; Stimson puts it at 25 per cent. Of 72 cases, 74 per cent. recovered (Fitz). Of the 72 cases about 36 were treated medically, and 11 per cent. died, and 14 per cent. spontaneously evacuated the pus late (Fitz). In medical cases the mortality is now 44 per cent.

Mortality from early laparotomy.—Of 24 cases of early laparotomy (McBurney), 23 recovered, 1 died. Of 35 cases of early operation (Weir), 34 recovered, 1 died.

Mortality from delay.—For one operation done by mistake ten deaths can be shown from waiting for signs of tumor or peritonitis.

Acute mischief after quiescence.—Of 30 cases of acute perforative appendicitis where recurrence was noticed, 22 cases exploded into abscesses or general peritonitis before the third attack; one case so exploded after the fifth attack.

Value of medical treatment.—Medical treatment—*i. e.*, rest and intelligent nursing—is of twofold value, 1st, in limiting the extent; 2d, in shortening the duration of mild attacks.

Items of interest.—Avoid deep epigastric artery and vein in making lateral incision.

A point in identification.—The anterior bundle of unstripped muscles on the colon, which terminates at the base of the cæcum, is in sight: it is a good guide to the appendix.

Abnormalities.—Anatomical relations of the appendix are sometimes abnormal; it was once found to left of median line, above umbilicus, with a short mesocolon.

What is recovery without operation?—Recovery without operation means relief from recurrent pain, and thereafter an improved condition of health for a longer or shorter time (Weir).

Definition of obliteration of appendix.—Obliteration of the appendix is narrowing of the appendix, which often follows catarrh of the part.

Percentage of obliteration of appendix.—Of 26 cases, 10 gave obliteration.

Why arrays of statistics.—The object of bringing statistics, percentages of recoveries, etc., before physicians is that they may realize importance of prompt operation (Vander Veer).

Where Pettit's triangle.—Pettit's triangle is between the latissimus dorsi and the external oblique muscle.

Period of activity in literature of appendicitis.—Much has been written on appendicitis in the last twelve years (1879 to 1891).

Period of active work in appendicitis.—Much work in appendicitic trouble has been done in the last two years (1889 to 1891).

Literature.—Buffalo Medical Journal, 1879; Transactions of American Surgical Association; Volkmann's Klin. Vorbräge, January, 1889; Annals of Surgery, October, 1889; New York Medical Journal, October 25, 1890; Transactions of Medical Society of the State of New York, 1891; Transactions of the Association of American Physicians, 1886; Medical and Surgical Reporter, February, 1886; Medical News, March 1, 1890; Lancet, 1889.

The above articles and others have been read in preparation for this paper.

Some of those to whom this article is indebted, and who have largely contributed to the biography of appendicitis, are the following: Drs. Abbe, Buck, Bull, Dalton, Ebebohls, Fenwick, Fowler, Fitz, Gerster, Hartley, Hektoen, Holgh, Hadra, Holmes, Krafft, W. W. Keen, Lange, Morton, McBurney, McMurtry, Mikulicz, Mynter, Matterstock, Mackenzie, Murray, Monks, Porter, Parker, Regnier, Réclus, Roux, Senn, Stimson, Lewis Smith, Sands, Greig Smith, Teale, Tait, Toft, Treves, Vander Veer, With, Weir, Wyeth.

FOUR OPERATIONS FOR APPENDICITIS: THREE RECOVERIES, ONE DEATH FROM A VERY SMALL CONCEALED ABSCESS.

By W. W. KEEN, M.D.,
PROFESSOR OF PRINCIPLES OF SURGERY, JEFFERSON MEDICAL COLLEGE.

[Special meeting, September 28, 1891.]

Case I. *Recurrent appendicitis; operation, after the fifth attack (with perforation and general peritonitis), by median and lateral incisions; recovery.*—Miss B., aged thirty years, a slender, frail woman. A year ago she developed a moderate lateral curvature of the spine through muscular weakness. Her father died of cancer of the bowels; her mother is living and is even more delicate than herself.

About fifteen years ago she had her first attack of perityphlitis. A few years later a second occurred, and about six years ago a third, which was the first in which I saw her. The attack was not severe, no suppuration followed, and after its subsidence she seemed as well as usual.

On May 31, 1890, she was suddenly taken with severe paroxysmal pain in the lower part of the abdomen, accompanied by vomiting. The attack was attributed to the eating of some strawberries, and when the bowels were subsequently moved by small doses of calomel a quantity of strawberry seeds was passed. The pain was relieved by morphia. There was slight general tenderness, not limited to the right iliac fossa. The temperature only rose to 101°. The attack gradually passed away, and in two weeks she was able to return home. For the account of this attack I am indebted to Dr. W. H. Morrison, who attended her. The symptoms rather pointed in his mind to an ordinary intestinal colic from the fruit, though as there had been prior attacks of perityphlitis the right iliac fossa was watched with some care; but no special dulness or tenderness existed there, nor was there any induration. There had been no chill.

The summer of 1890 was passed in comparatively good health. As soon as I returned from my summer holiday I was asked to see her by my assistant, Dr. W. J. Taylor. He had diagnosticated not only a renewed attack, but also a probable perforation of the appendix on the day of my return. She had been constipated for several days, and a slight movement of the bowels on September 30, 1890, due to divided doses of Epsom salt given the previous evening, was followed by symptoms of peritonitis over the entire lower abdomen, the tenderness in the left iliac fossa being possibly even more marked than in the right. The induration was only moderate. Exploration by the rectum revealed general tenderness of the pelvic viscera

with diffused induration, but no fluctuation. A vaginal examination could not be made. It was clear that perforation had taken place and that immediate operation was needful.

When I first saw her on the evening of October 1st, the symptoms, while clear, were not very urgent, and Dr. Taylor and I felt it safe to postpone the operation until the next day and so avail ourselves of daylight. The peritonitis was clearly local in the pelvis and lower belly and did not involve the entire peritoneum, and the depression and shock were not so great as to require instant interference.

Operation, October 1, 1890. The hair was shaved and the field of operation thoroughly disinfected. In view of the involvement of both iliac fossæ I deemed it best to make an incision in the middle line. As soon as the abdominal wall was penetrated pus began to exude very abundantly, and I estimated that over a pint escaped. The omentum was glued to the belly wall, and the pelvic viscera, including the intestines, were all glued together by adhesions, except where they were separated from each other by pus.

The appendix was at once sought for. It was firmly bound in place, as thick as a good-sized thumb, and so turgid that it was erect. It could not be brought to or even near the opening, and accordingly another oblique incision was made in the right iliac fossa, through which it was approached very readily. As soon as seen it was discovered that there was a small opening at its tip, through which the intestinal contents were escaping. With some little care it was freed from its adhesions, tied one-fourth of an inch from the cæcum, and removed. The stump was then disinfected and invaginated into the bowel, the peritoneal coating of which was secured by four Lembert stitches. The entire abdominal cavity was then thoroughly flushed with hot water. Two drainage-tubes of glass were inserted, one in each incision, and the wounds closed. I sought to carry the drainage-tube in the middle line into Douglas's cul-de-sac, but this could not be found as it was obliterated by adhesions. The drainage-tubes were emptied by a long-nozzled syringe whenever full.

December 17, 1890. In the twenty-four hours after the operation, without laxatives, her bowels were moved twelve times, and for a week afterward from two to four or six times a day in small quantities, semi-solid. The bladder was emptied most of the time by catheter. Her temperature, which two days before the operation had reached 103°, fell immediately after the operation to 101.6°, and four days after the operation had reached the normal. By the end of a week it had gradually climbed again to 102°, and on that day she had a severe "sinking spell," with much pain, cold perspiration, and excessively weak pulse. This was met by prompt administration of stimulants and digitalis, and in forty-eight hours her temperature had fallen about two degrees. Meantime her bowels continued to trouble her very greatly, with pain and frequent movements. Examination by the rectum showed the pelvic viscera to be matted together in a hard mass, which pressed upon the rectum and gave great annoyance. Until the eighteenth day after the operation her temperature fluctuated very markedly from normal or a little above to 101° and 102°, but on the nineteenth day, coincidently with the improvement in the bowels, her temperature sank to the normal and remained such during

the remainder of her convalescence. In fact, most of the time it was half a degree below normal.

Meantime the median wound gaped open to the extent of over an inch in consequence of the sloughing out of the stitches, but by the time it had gaped open a layer of granulation had sprung up on the omentum, which lay at its bottom, and without any interference other than the daily re-dressing—sometimes several times a day when the discharge was considerable—it slowly healed, and by the end of five weeks was entirely closed by a firm cicatrix. The drainage-tube was removed at the end of ten days, when there was no further discharge through it. The lateral wound healed without incident at the end of ten days.

After the lapse of three weeks from the operation her progress was slow but steady. A month after the operation she first sat up out of bed.

September, 1891. There is a slight tendency to a ventral hernia at each incision, for which she uses a binder. Her menstruation is regular and not specially painful. Examination of the pelvic viscera by the rectum shows them to be mobile and free from adhesions.

CASE II. *Perforative appendicitis of a week's duration; temperature of only* 99° *in spite of a large abscess; operation; recovery.*—H. T., male, aged forty-two years; admitted to the Jefferson College Hospital, February 11, 1891, at the request of Dr. C. M. Ellis, of Elkton, Md. Family history negative. He was taken ill on February 4th with pain all over the belly. This was not located in the right iliac fossa until two days later. His fever had run up to 102° and 103°. There was tumefaction in the right iliac fossa, but no œdema. There was resistance to touch, parallel with Poupart's ligament, and filling up half of the space between Poupart's ligament and the umbilicus. The point of greatest tenderness was one inch below McBurney's point. On the evening of his admission his temperature was only 100° and was no higher the next morning. On the evening of the second day, however, the temperature rose to 101.2°, falling the next morning to 99°. Finding that the vesperal rise of temperature continued and that a week had elapsed, I determined at once to operate. This was done in the public clinic.

An oblique lateral incision was made parallel to Poupart's ligament, which immediately liberated a large quantity of very foul smelling pus. The appendix was found to be swollen to about the size of the thumb, with a distinct perforation of the diameter of a knitting-needle at its extremity. The appendix was tied and cut off. A second smaller abscess cavity was found at a deeper level than the first, the pus from which was much more fetid than that from the first. The cavity was then thoroughly washed out with a sterilized salt solution, a drainage-tube was inserted and the centre of the incision united by a few stitches. Practically, these might well have been omitted, for at the end of three weeks, in order to secure free drainage of the wound it was necessary to lay open this adherent skin. He went home with a small, almost healed ulcer nine weeks after the operation. The highest temperature was 102.2°, on the sixth day.

CASE III. *Appendicitis from a fecal concretion; pus in the general peritoneal cavity; operation ninety to ninety-six hours after inception of the disease; recovery.*—J. S., a French lad, aged nineteen years. Admitted to the Jefferson College Hospital, February 28, 1891. Four days before this he was

in perfect health and at his work as a waiter in a restaurant. He had never had a similar attack. On that day he was seized with cramps all over the belly. By the next day the pain had become fixed in the right iliac fossa, and I was called to see him on the morning of the fourth day by Dr. J. C. Wilson, who had been called in on the previous evening. When I entered the room the tears were rolling down his cheeks, and he was groaning and writhing with pain. The bowels had been opened on the day of the attack, but not since. On the evening of the third day the temperature was 103°, and on the morning of the fourth day 101°. There was tumefaction parallel to Poupart's ligament, about three fingers' breadth in width, and the anterior wall of the belly and right side was tense, elastic, and resistant to the touch. It was extremely tender, and he indicated by one finger the tenderest spot at McBurney's point and one inch below it. The right leg was flexed to relax the belly wall. There was dulness on percussion, and a rectal examination showed considerable induration and obscure fluctuation. There was no œdema. There had been no vomiting.

As quickly as possible arrangements were made to operate, and the operation was done before the class two hours after I first saw him with Dr. Wilson, as nearly as could be determined, between ninety and ninety-six hours after the attack. The incision was parallel to Poupart's ligament. Although there was no external œdema, as soon as I cut through the aponeurosis of the external oblique, there was marked œdema of the tissues beneath this aponeurosis. At a greater depth a quantity of extremely fetid, very thin pus gushed out, and on washing out the cavity with a salt solution, I found an evidently gangrenous mass, with a knobbed free end, which looked like the appendix bound down by adhesions. A piece of the omentum was attached to it, and the appendix was distended, but clearly not perforated. It was ligated and cut off. Upon opening the amputated portion, I found a fecal concretion as large as a bean. So far as gentle manipulation could determine, there seemed to be no adhesion of the bowels to each other, and apparently the pus was contained in the general peritoneal cavity. This was well washed out with hot water and closed, and a drainage-tube was inserted. The patient made a rapid recovery without any serious complications whatever, improving from the very moment of operation. He went home in three weeks entirely well.

CASE IV. *Perforative appendicitis; pain below the ribs; laparotomy; death; concealed small abscess behind the colon.*—Mrs. F., American, aged thirty years, was first seen at 11.30 P.M., June 27, 1891, with Dr. Seitz. She had married at fifteen, and has had four children, the last three years ago. She has been perfectly regular, the last sickness coming on a week too early, ten days ago. A week ago she was suddenly seized with violent pain just below the right border of the ribs. A day or two later one of her children struck her accidentally over the same spot, producing intense pain. Five days ago she was seized with an aggravation of the pains, and was in such a condition of collapse that Dr. Seitz feared she would die. Her temperature was below 97°. Active stimulation soon relieved this, but the pain continued almost as severe as before. Another attack of collapse to-day, with cold extremities up to the knees and elbows, induced Dr. Seitz to call me in consultation. I found a slender, delicate-looking woman, with the right leg drawn up and

the right side of the abdomen excessively tender, with the muscular wall of the belly very tense. The slightest touch on the entire right side of the abdomen produced the most severe pain. On the left side moderate pressure was pretty well borne. The pain was most severe just below the border of the liver, diminishing gradually toward the right iliac fossa. The uterus and ovaries by vaginal touch were free from pain and swelling.

At the consultation it was decided to give her hypodermatics of morphia, with brandy and milk, and in the morning, if she was not better, to do an exploratory laparotomy.

June 28, 11 A.M. The pain continued as bad as before, with the extremities cold, and pulse irregular—92 to the minute—respiration 24, temperature 97.4°. An exploratory laparotomy was done, the incision being at the border of the right rectus. The diagnosis had been that of appendicitis or some indeterminate trouble with the liver or gall-bladder. The kidney did not seem to be tender. On opening the abdomen the lower border of the liver was seen, and was evidently somewhat reddened and fleshy-looking. This was bound to the colon by recent adhesions, and the peritoneum of the corresponding belly wall was deeply injected. The gall-bladder was normal, and there was no evidence of trouble behind the colon (see "Remarks" below) or with the kidney. No abscess or other cause for the inflammation could be detected. The right iliac region and caput coli showed no disease, but the appendix was not found. There was a considerable accummulation of serum in the right flank. The intestines were normal, also the uterus and the right ovary. In the left ovary was a small cyst. The abdomen was well flushed with warm water, and reluctantly closed after inserting a drainage-tube in the affected area. I felt assured that I had not discovered the reason for her dangerous illness.

4 P.M. She was much more comfortable than before the operation, and her extremities, though not warm, were much less cold.

29th. She passed a poor night, with constant bilious vomiting. Temperature 97.4°, extremities again cold. We ordered one-quarter of a grain of cocaine every hour and a full enema with glycerin, followed, if need be, by an enema of two drachms of sulphate magnesia every two hours.

6 P.M. Temperature 98.2°, pulse 92, respiration 24. Has had four large stools and feels much more comfortable. The belly is not nearly so tender. The vomiting ceased with the first dose of cocaine, and she feels hungry. A moderate amount of bloody serum had escaped by the tube, which was now removed. A considerable amount of apparently purulent, leucorrhœal discharge had occurred during the day.

July 2. From the time of the last note she gradually sank, with symptoms of collapse, subnormal temperature, and constant vomiting, until she died, at 9 P.M. on the 30th.

The post-mortem, thirteen hours after death, disclosed the fact that her death was caused by a perforative appendicitis. The appendix was three inches long and lay directly behind the cæcum and colon, being agglutinated to them, with no peritoneal covering, but lying between the two layers of the meso-colon. Its tip was perforated. Less than two drachms of pus mixed with a small amount of fecal matter were found in the abscess. The wound itself and the peritoneal cavity were entirely aseptic.

REMARKS.—I record this case especially as a lesson in diagnosis and a warning in treatment. When first called to see it, the history, the collapse, the rigidity of the right side of the belly and the flexure of the right leg all betokened an appendicitis. And yet the right iliac fossa was free from tenderness, free from tumor, free from œdema, free from pain. There was slight pain and tenderness all over the right half of the belly, but the most painful spot was far away from McBurney's point and was just under the border of the liver and about an inch inside the line of the anterior superior spine. The abdomen at this point over an area of 2.5 to 3 inches was so exquisitely tender that no satisfactory examination could be made. Although appendicitis was in my mind as a first thought, the position of the tenderness suggested possibly rupture of the gall-bladder from gall-stones, or a renal calculus as the probable cause. When the abdomen was opened the localized patch of peritonitis was external to the attachments of the meso-colon and showed no indication of any trouble back of the colon as its possible cause. In spite of this, however, I examined three several times with the most minute care the entire region of the colon from the cæcum to the hepatic flexure; first on its outer side, then on its inner side, and then by bi-manual examination from side to side and by palpation from before backward, and could detect no hardness or other evidence of any abscess.

That no larger an amount of pus should have formed after an illness lasting eight days is very unusual, and while I deeply regret not having discovered the abscess, I cannot but console myself with the thought that it was not for the want of a careful and thorough search, but by reason of the unusual conditions and the small size of the abscess. Whether in the absence of all physical signs of such an abscess it would have been my duty to dissect up the colon in order to examine the retro-colic tissues and appendix, or to have torn through the outer layer of the meso-colon, is a question I have much debated. Viewing now the facts I greatly regret not having done so, and I report the case especially as a guide and warning to other surgeons who may meet with similar cases.

DISCUSSION.

DR. WILLIAM PEPPER: I scarcely think that I need say much, for the subject as presented is so largely one of operative technique that the views of a purely medical clinician possibly are scarcely appropriate. Assuming that the subject under discussion includes all the acute inflammatory affections of the appendix, cæcum, and pericæcal tissues, much has been said to which I should take strong exception from the standpoint of a purely medical practitioner. I believe that if every case of appendicitis were operated on the mortality would be tenfold what it now is. For more than a quarter of a century I have been in the habit of seeing a great many of cases of appendicitis every year. I base this statement partly upon the classical researches of Dr. Fitz, who has demonstrated more clearly than any other, that in a large proportion of cases of right iliac trouble the appendix shares in the trouble, if, indeed, it is not the starting-point of the trouble. Now, as a general rule, these cases recover under medical treatment and remain permanently well afterward, no surgeon being associated in the treatment of the case. In no year during the past two decades have I failed to see a considerable number of cases of this kind, and the cases that have demanded operation, as contrasted with those which get perfectly well without operation, are probably at least as one to a score. I think that the assertion that as soon as appendicitis is suspected the surgeon should be called in, is quite out of accord with the experience of physicians the world over. As I have said, I think that the vast majority of cases, in first attacks at least, undergo resolution and terminate with some more or less permanent injury to the appendix, but without going on to the production of abscess, provided the treatment be instituted early and be kept up faithfully. In many of these cases there is early development of induration and fulness in the right iliac fossa, and in proportion as this appears early is it likely that the case will run a favorable course, or, if later, it develops signs of suppuration it will admit of treatment by the simple Willard-Parker extra-peritoneal incision. In proportion as the symptoms are violent, without localizing phenomena in the right iliac fossa, is there danger that rupture of an abscess has occurred, to be followed by the development of general peritonitis. I am entirely at one with the speakers who insist on early operation where this latter condition exists. I have had the operation performed as early as thirty-six hours from the initial symptom, and have found suppurative peritonitis already present. I am sorry to say that in this case there was a fatal result, as will sometimes happen in the hands of the most skilful operator. I think that the experience of all will confirm the statement that the operation is a grave one. The operation of laparotomy for disease of the appendix, whether it is exploratory or radical, is not a trifling operation, and I have rather extensive records to show that it is an operation attended with a great deal of danger, even in the hands of the most brilliant operator. I should protest against the view that, as soon as the diagnosis of appendicitis is made, an operation should be encouraged.

I believe that it is possible to note the time, in a certain large proportion of

such cases, when the symptoms indicate the spread of inflammation, and then I think that the operation cannot be too promptly performed.

The question of diagnosis remains, in spite of all the good work that has been done, a most difficult question. The McBurney point I believe to be largely without value, uncertain in its location on account of the very varying relations of the appendix, apt to be mistaken for points of tenderness due to wholly different causes, and apt possibly to be mistaken for sympathetic tenderness of nerve points in the abdominal wall. I therefore believe that this sign, from which much was hoped, will prove to have very little positive diagnostic value.

The rectal examination has seemed to me to be of very material value; it is true not so early as we could wish, but in many operative cases I have found the roof of the pelvis altered as determined by a careful rectal exploration. I feel that I am wholly incapable of putting in words, nor do I know that this has been done, the exact differential diagnosis of the cases which demand early operation. While this is true, I would still urge the view that this does not justify the subjection of every patient with appendicitis to laparotomy. I trust that we shall learn to arrive at a more exact differential diagnosis. There is a combination of a certain history of the development of the case, which, taken in connection with the facies, the general symptoms, and the abdominal condition, as determined by external and by rectal examination, will, in the hands of an experienced clinician, serve in the great majority of cases as a basis for this diagnosis. It is difficult to state this in terms as precise as we should state the terms of a diagnosis of encysted pleurisy, but I think that those who have studied these cases will recognize a *tout ensemble* which admits of a diagnosis of those cases which should be subjected to early operation. I believe, on the other hand, that in the great majority of cases we are justified either by the mildness of the symptoms or the localizing tendency in the right iliac fossa in urging medical treatment, and this is further justified by the very frequent recovery of these cases.

Lastly, I shall say a word as to my entire opposition to operation in the majority of cases in the interval between recurring attacks. I think that medical records will show too many cases where thorough treatment, hygienic, dietetic, and medical has been followed by complete cure. I have had so many such cases in which cure has occurred after a number of recurrent attacks, that the adoption of a general rule that where a patient has had two, three, or more attacks he should be subjected to a grave operation like laparotomy, seems to be a dangerous postulate. I think it better to secure the consent of the patient to the performance of the operation, should alarming symptoms make their appearance in any attack, and then to persevere with carefully regulated medical treatment. There are cases unquestionably where the conditions of the patient, the fact that he may be attacked when out of reach of skilful surgical aid, make it necessary for the patient to decide between a change in his habits of life and an operation. These are exceptions, and it does not follow that a general rule, that laparotomy should be performed in the interval between recurrent attacks of appendicitis, should be laid down.

DR. KEEN: I wish to take exception to what Dr. Pepper has said in reference to not calling in a surgeon in a case of appendicitis until operation

is needed. I think it of the most urgent importance that the surgeon be called in not to do an operation, but for consultation for his judgment rather than his knife—not necessarily to do a laparotomy immediately, but for the purpose of being ready to deal intelligently and promptly with the conditions when the time for operation arrives. He should not be called in, then, new to the case and unfamiliar with its features, and needing, therefore, time to become familiar with it, unless the case is so serious that operation is evidently and instantly required. The surgeon should be with the physician the moment the diagnosis is made, not to do the operation then, but to be ready to do it the moment that it becomes necessary. I have seen cases lost, and have lost some myself, I am sure, from delay, from the natural unwillingness to plunge right in and do a laparotomy the moment we are called to see a case that really needs it, and yet from unfamiliarity is regarded as a doubtful case. We should have every point at our fingers' end, and be familiar with the fluctuations of the symptoms. Then our aid will be much more valuable than if we are called in only when the emergency for operation has arisen. A plain case everyone can read and decide quickly. It is the doubtful cases that need carefully weighed decision—a snap judgment on a sudden call is more apt to be wrong than right.

MR. THOMAS BRYANT, of London: I assume that the term appendicitis as here used includes all those cases which have been spoken of as typhlitis, perityphlitis, and by other names, all of which have probably more or less connection with the appendix itself. Starting with that assumption, I at once proceed to the treatment of appendicitis. Here at the beginning, although a surgeon, I agree very strongly with the observations of Dr. Pepper. I am convinced that operative treatment is most valuable in appendicitis. I am equally convinced that delay in operating is the wisest course in the majority of cases. I should like to say in this place that it seems to me that the authors are a little mixed in regard to the classification of these cases. They have included cases that are acute from the beginning with cases that are not acute, that have a slow and steady course. The cases that have a slow and steady progress, that begin with localized pain is the right iliac fossa, accompanied with tenderness and soreness, less swelling without any very acute symptoms, are cases which you must feel can be dealt with satisfactorily without the surgeon's knife; I do not say without the surgeon's aid, but without the surgeon's knife.

Dr. Morton spoke strongly of the use in these cases of calomel and podophyllin. Such statements rather startled me, and I should have been glad to have had some evidence of its value given. I should prefer to follow the line of treatment suggested by Dr. Pepper, and not give calomel and podophyllin in frequently repeated doses. I would rely more upon rest, belladonna externally and opium internally, and diet, believing that by such means and knowing that by such means the bulk of the cases are permanently cured. In exceptional cases where these good results do not occur and graver symptoms appear, the swelling increasing and with symptoms of peritonitis, the surgeon's aid becomes of immense value, and certainly where these symptoms do appear and there is a steady progression toward the bad, it is unquestionably time for the surgeon to take a hand. In all acute cases I have no doubt as to the right of the surgeon to interfere. I have seen cases where within

thirty-six hours after such acute symptoms it was necessary for the surgeon to expose the part and let out the inflammatory fluids, if not remove the appendix itself. To my mind these two classes of cases which I have briefly described fairly indicate the line that the surgeon should take: trusting very much to expectant treatment in the least acute cases and surgically interfering early in the acute.

In reply to the question in regard to the propriety of operating, whether or not the surgeon is justified in operating between the attacks, my judgment would decide in the negative. In the majority of cases there is no second attack. If there is a second attack it can be treated on the same lines as the first, only there is a tendency toward interference if the symptoms do not settle down rather rapidly. I say this because I am sure that I have seen many instances where things have settled down after a second attack without any further trouble. Because we have met with cases that after the second, third, fourth, or it may be the eighteenth attack, have at last come to the surgeon's knife, I think that we should not accept that as a decided evidence in favor of surgical interference. In fact, we must be governed by each case by itself, and we should surgically interfere only when we find small chances of Nature terminating the case guided by medical skill.

Then we come to the operation. I am not sure that I am quite in accord with the authors of the papers. It is quite true that in doubtful cases of appendicitis—that is, cases in which you do not expect to find a great deal of pus or inflammatory fluid, the incision in the right semilunar line will probably be the best. In this way you come down readily on the cæcum, and you are more apt to find the appendix. The majority of cases with which the surgeon has to deal are not quite in the stage to which I have referred. There is generally much more diffused swelling about the cæcum, and that swelling gravitates backward and upward, sometimes toward the loin. I can recall a good many cases that I have opened where I was certain the swelling was about the cæcum, when it was backward toward the lumbar region. I can recall several instances in which my attention was drawn more to the lumbar region than to any other part, and it was only by going into the history that I concluded that the trouble was located in the cæcum. The lateral incision is a good one in these cases, but it must be more lateral than the semilunar line. I have made my incision well back, corresponding to the line of the anterior superior spinous process and tending backward toward the loin. In this way you get well at the cæcum and your finger can be readily passed into the iliac fossa. You can examine the part, you can drain the part well, and generally by the open treatment, not being too careful to stitch the wound, a good result takes place. I would say that in a large number of cases—my friends may say neglected cases—an incision more posterior than the semilunar line would be the better one. The incision in the semilunar line should be reserved for cases that have not advanced to such an extent as I have just indicated. If there were time I could give the Society many cases as illustrations of the truth of what I have said.

Another point to which I should like to allude is the question whether or not these are all really cases of appendicitis. In at least three instances of cases which had presented a history of a cæcal trouble, but in which death had resulted from some other cause. I have found cicatrices in the posterior

part of the cæcum some distance from the appendix. In two cases that I have treated the evidence pointed to the cæcum as the seat of trouble. In one, a boy, aged twelve years, I incised an abscess, and eventually a large orange-seed escaped. I have no reason to believe that that could have come from the appendix. In the second case a piece of bone that had been swallowed had evidently passed through the wall of the cæcum and caused suppuration. These two cases presented all the features of typical appendicitis. They were dealt with in the way that I have stated and both recovered. We must, I think, bear in mind that these cases are not all due to disease of the appendix, and that many of them may have no connection with it.

This brings me to another point, and that is whether or not, under all circumstances, it is expedient to search very carefully for the appendix.

In these severe cases should we disturb the parts so much as is often absolutely necessary? We have had to-night good evidence of the difficulty of finding the appendix in some cases. I have always felt that in these cases we should do more harm than good if we searched too far for the appendix. I am satisfied with well irrigating the part and treating it by the open method.

Dr. Morton has mentioned hernia as following the operation. I have never seen this. That may be because the bulk of my incisions have been made posteriorly. I have done many of these operations, and have seen many others done by my friends, but I have never seen hernia as a result.

Dr. J. M. Baldy: It has always seemed to me that it was not so much a question of the diagnosis of appendicitis as the differentiation between the operative and the non-operative cases. The diagnosis of appendicitis *per se* is extremely easy; at least, so I have found it. As far as symptoms are concerned, I know of only one that is of constant value, and that is, constant, deep-seated pain in the right iliac fossa, with induration. I think in such a case there is little question but that there is inflammation in or about the head of the cæcum, and, presumably in the majority of cases, in the appendix.

Mr. Bryant has spoken of cases where large foreign bodies have been discharged through an abscess, and claims they have come from the cæcum. He offers no evidence of this, except the size of the body. I have seen the appendix sloughed off, leaving a sufficient opening in the cæcum to admit the index-finger, so that I cannot see that the size of the body indicates in any way that it came from the cæcum, and not from the appendix.

I have been glad, and at the same time rather surprised, to hear the McBurney point condemned. I believe that it is utterly worthless as a reliable point in the diagnosis. It is one of those attempts at refinement in diagnosis which are apt to lead only too many astray. I have tried to apply McBurney's point, but have failed in every case.

The rectal examination may be of value in many cases, but we have all seen cases—and Dr. Keen's is one in point—in which there is a small abscess high up, which could by no possibility be recognized by rectal examination. If the abscess contain many ounces of pus, it will generally extend downward toward the pelvis, and may be felt through the rectum. There are, however, so many cases in which this cannot be done that we can place no definite value on this method except in a limited number of cases.

I cannot help thinking that purgation is of distinct value when I see the great relief afforded to a man groaning with the most intense pain, simply from having a movement of the bowels. It may not be curative, but in every case, whether abscess is present or not, it gives great relief. I believe that purgation should always be used. At the same time, if the patient was suffering, I should not hesitate to use opium until the purgation had acted, or after it had acted in case of necessity. The amount required is not great, and it will not interfere with the purgation. Those cases in which it is difficult or impossible to induce purgation, are going to do badly.

I know of no other intra-abdominal disease in which it requires more skill and practical experience to differentiate between those cases that should be let alone surgically, and those which should be operated on. I grant that the majority of cases of appendicitis get well without any operation. Again, there are certain cases that do badly from the beginning, and in which operation is clearly indicated. But, with certainty, there remains that large class of border-line cases in which it is next to impossible to say whether pus is present or not. If there *is* pus no one should hesitate. The operation for abscess is simple and easy. The abscess once opened, I do not think that in these acute cases any time should be lost in searching for the appendix. In trying to finding the appendix, and even when found, in trying to remove it, the general peritoneal cavity will often be opened, and life will be lost where otherwise it would have been saved. Only one case, as far as I am aware, has been reported, in which the abscess has been opened and the appendix left, where a second operation was required for a severe recurrent attack.

I believe with Dr. Keen that the surgeon should be associated with the case from the beginning, although not necessarily to operate. When a physician is called in to operate, the tendency, if there is doubt—and doubt only too often exists—is to postpone the operation. If the surgeon has seen the case from the beginning, and studied the symptoms and knows the details, when the time comes he will have made up his mind whether or not to operate. If, however, the surgeon loses another twelve or twenty-four hours in hesitation, in addition to what the physician has already lost, the patient may be irretrievably lost. The deaths after operation are due not so much to operation as to delay.

It is impossible to lay down any rule as to the time at which operation should be performed in any case, or in any class of cases. In some the onset is so sudden and violent that it is impossible to come to any decision as to the seat of disease. This was the case in the patient reported by Dr. Keen, and in another instance I know of in New Jersey. In the latter case, it was not until a few hours before death that the symptoms were sufficiently marked to cause any alarm. This is often the history of cases in which the operation is postponed. The patient will be doing well until within a few hours of death, when the end comes suddenly, and the patient sinks rapidly.

DR. FRANK WOODBURY: Although as a physician I look at this subject from the medical standpoint, I am in favor of operating. To save time, I may say that I heartily coincide in the statements made by Dr. Pepper. I also endorse the remarks of Mr. Bryant, in which he anticipated what I had intended to say—that is, that each case must be studied by itself. I think that

the surgeon and physician look at these cases a little differently. The surgeon is looking for general rules to govern him in the treatment of cases, while the medical man is more in the habit of individualizing his patients. Concerning the propriety of operation and the results to be anticipated therefrom, we all acknowledge that there is in some individuals a tolerance to operative interference and to suppuration that does not exist in others. Some will survive dangerous gunshot wounds, others will perish from a slight injury. There are probably points that will enable us to determine this difference in tolerance of different individuals, and, were they in our possession, should undoubtedly enter into the question of operation, but at the present time, unfortunately, we are not prepared to formulate these points in any given cases of appendicitis which come before us. Physicians, who are accustomed to go into the history of the patient and to investigate the antecedents of the case, know that individuals who belong to families with a high physical standard and who lead regular lives, are able to stand severe illnesses and operations, coming through them speedily and well, while others, having poor family history, bear very little surgical interference, and easily succumb to disease.

The question of the time of operation and propriety of operation really resolves itself into the query, "At what time does a case of appendicitis become a surgical case?" I would here raise my voice against the physician yielding to the temptation to put in a hypodermic needle into an iliac abscess or swelling in order to make the diagnosis. As soon as he does that he takes surgical responsibilities on his shoulders, and in no case are they likely to be more serious than in appendicitis. The physician should have sufficient surgical knowledge to determine when the time for operation has arrived, or, acknowledging his inability to decide this, he should secure the best obtainable surgical advice—not necessarily to operate, however, but to determine the propriety and proper time for operation, if found necessary.

Among the cases that come to my mind, three stand forth prominently. One was the first case which I saw, some eighteen years ago. A man in the lower walks of life, continued at his work as a machinist, making no complaint, until one day he fell on the floor of the shop in a collapse, and was brought to the Pennsylvania Hospital. He had a feeble pulse, and a Hippocratic face; the surface was cold, and, as he was dying, no attempt was made at diagnosis. He died in a few hours, and the post-mortem showed it to be a case of perforative appendicitis, with perforation and the usual foreign body. Here there was a question of operation. The patient did not seek medical advice, and there was no time for operation.

The last case I saw in my own practice occurred last spring, in a patient whom I had attended at intervals for a number of years. I had attended him a year before with a light attack of appendicitis, and warned him that if he had a subsequent attack he should consider the question of operation. He did have a subsequent attack while away from the city, and on his return was attended by another physician for three months. The man improved and was about, but always felt a weight and pain in the right iliac fossa. He was then taken with acute obstruction of the bowels with intense pain, and finally I was sent for In this case nothing that was given him produced a movement of the bowels. I may say that in this case Dr. Thomas G. Morton

operated on the second day after I saw him, but the patient died five days later without a movement of the bowels. The bowels were probably matted together and gangrenous.

The third case that occurs to me is one operated on also by Dr. Thomas G. Morton five years ago, which I have reported to the College of Physicians[1] and to this Society. I believe that Dr. Morton claims that this was the first case in this country where the correct diagnosis was made prior to operation of amputation of the appendix, and where the patient recovered. The patient has been well since the operation, although prior to it he had had a number of attacks. The patient is present to-night, and I should be pleased to show him to the Society. He is still wearing a light truss to protect a weak place in the abdominal wall at the lower portion of the incision. [The patient was exhibited.]

DR. H. A. HARE: I rise for information rather than to discuss the surgical aspect of the papers which we have heard. Like Mr. Bryant, I am at a loss to know why calomel and podophyllin, the latter in such large amounts as one-eighth of a grain every twenty minutes, should be given after an operation for appendicitis. Podophyllin is the slowest acting purge in the Pharmacopœia, taking eight or twelve hours to produce an effect, as a rule; not only this, but these drugs act on the small bowel, high up, while the appendix is in the large bowel, low down. If saline purgatives were ordered it seems to be a better treatment, for we have evidence of their great value. Even these are not without danger. I do not believe that a man can take one-eighth grain of resin of podophyllin every twenty minutes until he is purged without producing much intestinal griping and pain. Anstie pointed out that podophyllin was a distinct irritant, particularly to the small intestine.

DR. DE FOREST WILLARD: Mr. Bryant has said that he has not seen hernia follow this operation. A boy came into my office to-day on whom I operated two years ago. He did perfectly well for a year, when on attempting to lift a heavy body the bowel protruded through the centre of the cicatrix. He had worn a bandage and a truss, but I put on a heavier truss, which relieved him for a time. He returned in four months; the pressure of the truss had produced a large slough, and he came near having a perforation of the bowel. The ulcer finally healed. He now has at the outer angle of the wound a second small hernia, and at the inner angle there is a slight tendency to protrusion. The wound was a large one. The boy was *in extremis* at the time of operation, and there was an enormus accumulation of pus.

In regard to deep-seated pain and induration in the iliac fossa as a diagnostic sign, I have seen cases in whom there was not a particle of local pain or of induration.

The boy already mentioned had no such symptoms. He had been kicked at the umbilicus, and the pain was chiefly at that point, yet the abscess was in the iliac region. The appendix was open, and a small mass of feces had escaped. There was an enormous accumulation of pus extending down into the pelvis on one side. The appendix was removed, and the opening stitched.

DR. M. F. KIRKBRIDE: In the past year and a half I have had four cases, but shall speak only of one. I shall first refer to the history of the case as

[1] Case reported in Proceedings of the College of Physicians of Philadelphia, vol. vii.

given in a letter to the previous attendant. The physician was called on Thursday, April 3. The patient had been constipated for one day. It was at first thought that the case was one of typhoid fever, as the father had recently recovered from this disease. Calomel was given, but no action secured. Citrate magnesia was given with the same result. The pain and tenderness in the right iliac region increased. There was some tympanites. Injections of soap and water with a few drops of turpentine were practised with no result. Salts in one-drachm doses were then given without effect. Vomiting began. It became apparent that it was a case of appendicitis with obstruction of the bowels. Injections given on Saturday morning were not retained. On Saturday a surgeon was called in consultation. Operation was decided on, but as the surroundings were not suitable the family was advised to have the patient admitted to a hospital. This they agreed to do, but at 3 P.M. decided not to do so. The physician in charge then declined to have anything more to do with the case.

I was called to see the patient on Sunday evening, at ten o'clock. The temperature was 99.5°, the respiration 36. No pulse at the wrist. The heart beat 130. He vomited everything, and for several days had had stercoraceous vomiting. I gave hypodermics of morphine and atropine, and afterward hypodermics of strychnine. After he had reacted somewhat I put him in the knee-chest posture, and gave an enema of sulphate of magnesia, turpentine, glycerin, and warm water, and gave whiskey and turpentine by the mouth. I also gave for several hours sulphate of magnesia in one-drachm doses. The first two doses were rejected, but afterward there was no vomiting whatever. In three hours I had the tumor removed and the boy sleeping comfortably, and after that he got along nicely. On the sixth day after I was called a slough passed from the bowel. This was three inches in diameter. The case then went through that of a regular case of typhoid fever, as far as the temperature was concerned, and even showed the eruption. The diagnosis of appendicitis was made by two physicians and an eminent young surgeon.

DR. JOSEPH HOFFMAN: McBurney's point has been condemned, but the reasons have not been given. The position of the appendix varies. You cannot lay your finger on any special point and say that there the appendix should be found. We must remember that the appendix revolves in three planes, and that, therefore, it may have three systems of revolution. We cannot expect to find the appendix in the same position. This anatomical point forever blots out McBurney's point.

In reference to purgation, I had a case of which I shall recite the points in which the use of calomel and opium comes out beautifully, so far as the apparent curative effects are concerned. Dr. Wheeler was treating a case of appendicitis with opium for some days without benefit. He then called me in and I brought Dr. Price. He was then purged with calomel after the opium treatment, and the pain entirely disappeared. Shortly afterward he went to Baltimore and had a recurrent attack, from which he died. This shows what purgation will do.

DR. M. PRICE: We are certainly slightly mixed in the discussion of this question. The physicians are talking about appendicitis without perforation, and the surgeons of appendicitis with perforation, conditions entirely oppo-

site. Drs. Pepper and Meigs say they never saw but one single case of perforative appendicitis get well, and they reported that case themselves. It is true that this statement was reported fifteen years ago, but that does not make the disease any the milder.

There is one other point. It is absolute folly to operate for appendicitis and expect good results, unless you can purge the patient. If you succeed, and after the operation persist in the use of purgatives, every case, so far as I know, will recover.

If at the operation there is found a barrier separating the abscess from the general peritoneal cavity, thorough irrigation of the abscess cavity is required. If this barrier cannot be demonstrated, thorough irrigation of the whole peritoneal cavity should be insisted upon. In a case operated on five weeks ago, there was well-marked thickening and induration in the right iliac fossa. I removed five or six ounces of pus, and when I came to irrigate, although I used every precaution, I found the small intestine slipping by my finger. I washed the abdominal cavity out thoroughly, and passed in a straight glass drainage-tube, held in position by one stitch at the lower angle of the wound, and then packed with gauze down to the knuckle of intestine. The appendix was eaten off by an ulcer, and so gangrenous that I was afraid to touch it. The man was purged every day for a week, and made an uninterrupted recovery. I may mention that I have never seen a case of appendicitis with perforation and general peritoneal inflammation without a subnormal temperature.

DR. MORTON: There are many symptoms that have not been mentioned. Bladder irritation is a prominent symptom in some cases from inflammation or pressure on the ureter, or of the bladder wall. This brings out one of the dangers in operating on the appendix. Mr. Treves has predicted that some day a portion of the ureter will be taken out in mistake for the appendix or torn out with it.

It is also to be remembered that in perityphlitis the superficial veins are more engorged on the right side of the body than on the left.

Perhaps my views in regard to the time of operation have been misunderstood. What I desired to say was that no case that is not improving should be permitted to go beyond the third day without surgical interference. I do not mean to say that all cases should be left so long. In some the operation will be required in the first few hours; in others on the first day, and in still others on the second day. The great majority of cases will recover from the first attack at least, upon purgation, topical applications, and regulation of diet.

Another danger of allowing septic processes to go on in the neighborhood of the appendix is the development of phlebitis in the branches of the mesenteric vein causing troubles in the liver. Pain in the liver is often a sign of appendix disease. It has been held that many cases of abscess of the liver have originated in septic processes around the appendix infecting the veins. I saw Dr. Steinbach operate on a case in which the patient before operation showed a tinge of jaundice. The appendix ran upward nearly to the liver and was surrounded by a large abscess. Intense jaundice supervened after the operation, and the man died apparently from acute inflammatory degeneration of the liver. I believe that the liver trouble was a septic complication from the appendix.

In regard to the use of calomel and podophyllin, I would say that I know

very little about experimental therapeutics, but after giving the various purgatives a thorough trial I have found that minute doses of calomel and podophyllin frequently repeated give the best results in these cases. They move the bowels thoroughly and with rapidity. In the case reported from fifteen to twenty movements were secured in eight or ten hours. These small doses cannot be vomited as readily as a drachm of salts can be, nor do they produce emesis even shortly after etherization, when salines would not be tolerated by the stomach. After the bowels have been thus started and the stomach quieted as a consequence, salts will be retained, if indicated, and work with greater promptitude and efficiency.

DR. PRICE: I rejoice that in America we have adopted some of Mr. Bryant's surgical wisdom in regard to appendicitis as well as in regard to hernia: "If you find a man hanging, cut him down."

I will allude to three cases in which there were recurring attacks. In one, the man had had twelve to fourteen attacks. I saw him in the last in collapse on the eighth, tenth, or perhaps the twelfth day. In this case the argument offered by the family physician was the common one, that as the patient had recovered from so many attacks he would also recover from this. This is a dangerous argument and often a fatal one. I said that this man would be dead in three hours; he died in an hour and a half. In a recent case I saw the patient on Monday. Dr. Agnew saw him on the same day, and we both urged section. The physician and family decided to wait. On the following Friday Dr. Agnew was asked to operate and refused. Many of us are now taking high ground and refusing to operate at the eleventh hour. It is not fair to surgery to operate on dying patients. Dr. Agnew has recently operated in the twenty-fifth attack, removing a huge appendix, and the boy recovered.

Deaths from appendicitis are very numerous; indeed, more so than a year ago. They were then called typhoid fever, but now our methods of diagnosis are more accurate.

Mr. Tait's recommendation of drainage has been referred to. That would be as bad surgery as to drain a huge pus tube. The cheesy, disorganized appendage remains. No one would cut down on a sequestrum in bone disease and simply put in a drainage-tube.

I have the records of two cases of appendicitis, in one of which the opening was through the lungs and the other through the œsophagus. Dr. Hunter McGuire has reported a case in which the appendix was found floating in a puddle of pus. You will all remember the illustration in the *British Medical Journal* or the *Lancet* of a year ago of a case of hepatic abscess with a large opening through the loin. You could see the liver, the kidney, and the colon. The man lived twelve days and died of dysentery. I never see a case of neglected appendicitis without thinking of this case of neglected abscess of the liver. In most cases that we see the small intestines are enormously distended and the pelvis is filled with adherent knuckles of bowel. In these you often have obstruction. In many cases the use of a purgative is simply folly before the adherent knuckles of intestine have been released by operation.

I scarcely favor the long ligature method. In these cases I have inverted the stumps, and the transfixation has been made with the finest needles. If the appendix sloughs it goes inside.

The McBurney point is wholly ununiform and worthless.

OBSTRUCTION OF THE BOWEL.

By M. PRICE, M.D.

[Read October 14, 1891.]

The treatment of obstruction of the bowel is a matter of the greatest importance to the public as well as the profession. There is no subject or condition where life so positively depends upon a proper appreciation of the conditions and immediate and correctly applied surgical treatment.

There is no condition where the complications are so varied, from simple hernia to virulent malignancy; there are so many conditions that will produce obstruction, that the wonder is that any of us get through life with a complete and healthy bowel in our body.

The causes of obstruction are almost innumerable, and every case is one to be dealt with in a manner peculiar to itself. The life of the patient depends upon the ability of the operator to cope with the complications, more than any other factor.

To appreciate the difficulties to be overcome in this department of abdominal surgery, one has but to examine the work of Senn and a host of others who have done work in the abdomen, and ask any one of them what part, if any, is easy of accomplishment.

In most cases of obstruction of the bowel there is no indication or symptom to indicate or direct us to the point of obstruction.

We may have a patient with an enormously distended abdomen, with symptoms of peritonitis, with fecal vomiting, with pulse and temperature to indicate a condition of things for most urgent and prompt action. Or we may have an obstruction with scarce one of these symptoms to direct us in our investigation. Help can only come to a patient suffering thus from one who can correctly read the symptoms and correctly interpret their magnitude. Abdominal surgery for many years offered hope of relief to a very small number of abdominal diseases, but now surgery has thrown open the door to all who suffer with abdominal disease with the same oppor-

tunity for relief that the surgeons offered only a short time ago for ovarian tumors, with a vastly improved method and a greatly reduced death-rate.

In obstruction of the bowel there are so many questions and conditions to be considered before operation, that when the time comes to operate, it is very much like a well-planned battlefield with every division in position and all the minor details settled: the work of battle begins, and the surgeon only awaits the development of the enemy, or disease, with which he has to contend in the completion of his work in the removal of the conditions present.

The first question to be decided is, Is there a strangulation present, or an obstruction, or a condition of partial paralysis induced by over-distention by a costive habit, or a condition produced from loss of proper nerve force for the performance of bowel digestion and elimination, or is it a paralysis following convulsion with general paralysis of the entire body? All these questions have to be answered some time in the experience of every operator, not all in the same case, but they all have a place in the consideration of the question in hand, and the operator who does not keep his mind impressed with such possibilities will sooner or later have cause to regret.

There is no better place than just here to relate a case in point. Dr. Ewing, of West Grove, asked me to see a patient with symptoms of obstruction of the bowel, in a woman sixty-five years old, who had been suffering for five days from great distention, the bowel showing through the abdominal wall very much like a mass of sausage under a linen cloth, an increased pulse and a temperature something above the normal, but not enough to indicate a serious condition. The other symptoms indicated an element in her condition that led me to investigate further for a cause. The doctor had used all the agents, purgative and otherwise, without effect; the stomach now refused all drugs. The daughter stated that the patient had a convulsion two nights in succession before the doctor had been called to the case, and that she had been quite stupid and unlike her usual self since that time. The knuckles of intestine lay without a particle of movement, no peristalsis; in fact there is a condition of paralysis following a convulsion that so closely simulates obstruction, that it is with great difficulty that we come to a proper appreciation of the symptoms. This patient had also vomited very questionable matter, and together with the other symptoms seemed to indicate a plain case for operation; but there

was a question of doubt, and while waiting a period, the use of sulphate of magnesia in large and repeated doses by injection brought the desired result—clearly showing that we must be on our guard with every case.

The stomach exercises a marked influence in obstruction of the bowel; the changed current and direction of the bowel contents in the effort to find an exit, changes the stomach from an organ for the digestion of food to that of a pump for the elimination of the contents of the bowel through the mouth, and by so doing gives us a direct and positive indication for treatment, which to be most effective must precede any operative treatment that may be required.

We should empty the stomach and wash out all the contained fluid and solid contents. How best to do this is a question by no means yet answered. For my part I much prefer the stomach, aided by warm water and a mild emetic, to do the work, when the patient is in a condition to warrant such an effort, but many of them will not be; then only the pump must be used. It is a most disagreeable instrument and should be used with great care, and not removed until all the work of flushing the stomach is finished. If you operate for strangulated hernia after there has been fecal vomiting and leave the stomach to get rid of its disagreeable contents as best it can, you have but half done your work, and more than probable the portion left undone will finish your patient.

In a complete cleaning out of the stomach you have added greatly to your patient's comfort and to his immediate and rapid recovery, beside having left nothing in the way of a clear surgical conscience. Therefore a stomach-pump is requisite to perfect work in obstruction.

TREATMENT.—The saline treatment of complicated inflammatory conditions and those simulating inflammatory obstruction of the bowel are of twofold value, first in clearing out a bowel not obstructed, but torpid and distended with all the filth of months; again, in actual obstruction, where we have a condition of paralysis produced by the inflammatory condition, which can best be removed by sulphate of magnesia. The effect of the saline does not in the least hinder the operative treatment, but prepares the patient for a much more speedy recovery from the effects of the inflammatory condition and the operation for the removal of the cause of the obstruction. If the obstruction be purely mechanical, then the saline aids the efforts of nature to promptly throw off

all the retained and decomposing materials remaining dammed up in the intestine by the obstruction.

After an obstruction of the bowel has existed, even for only a short time, the distention has in most cases been so great that it takes a long time for the bowel to recover its tone and normal function, and if the saline treatment has been used before the operation the time for recovery will be much shortened and the risk and suffering of the patient correspondingly lessened. All those who have done intestinal work have been impressed with the length of time after an operation for strangulated hernia before any action of the bowels can be had, even with salines. I have had as much as six and eight days pass before I could get the bowels moving in cases of obstruction of the bowel from inflammatory incarceration. And in another case as much as eleven days intervened after a resection of five inches of obstructed colon from epithelioma and uniting them by the Senn method. In this case four ounces of magnesium sulphate was given before any result. In several of my cases I feared that I would have to do them over; and I have no doubt the abdomen has been reopened many times after abdominal operations for a supposed obstruction when none existed. So great care and judgment is required in these cases, that something positive only should drive us to a second operation. Simple want of a movement of the bowels should put us on our guard and watchful for more certain symptoms of obstruction.

Now as to how sulphate of magnesia will give the best and quickest result: Small and repeated doses diluted with as much water as the patient will take is by all odds the best mode of giving the drug. When the stomach is irritable and sick, it is best given by injection per rectum—an ounce of the drug in half a pint of warm water. If you can give by the stomach and bowel at the same time, you will soon get the result.

There can be no objection to other drugs being used, such as the mild chloride of mercury, or Rochelle salt, that will accomplish the object for which we use purgative treatment. Mixed treatment of opium and purgatives does no good, but introduces an element of doubt and danger that is hard to estimate; it also tends to prevent a proper appreciation of what nature is doing to save the internal viscera from permanent destruction and death. If we give purgatives we must give them for a purpose, and until that object is attained we should wait until we are perfectly satisfied that nothing but an operation will open the way for a passage, or that our patient

cannot be relieved, and then the opium treatment will be appropriate; then use it, but not while there is a chance for the patient's recovery.

Mode of Operating.—The method of operating for strangulation of the bowel or hernia is of great importance and should be seriously considered before operation. The method of cutting directly down on the hernia will not answer in all cases: old irreducible hernias, where both sides are down and irreducible with symptoms of obstruction; double femoral, also irreducible and in cases where there are no external symptoms pointing to the location of the disease—these can best be dealt with through a median incision.

The usual opening for abdominal operations of one and a half inches is plenty of room in which to do all the work that is required for the relief of the patient in most cases, and when we find we require more room, it is easy to enlarge the incision. Through this opening a thorough investigation of the abdominal cavity can be made, the old hernial irreducible protrusions can be examined with two fingers in the peritoneal cavity, and the seat of the strangulation located.

The fact that there is a hernial protrusion on either side is no proof that one of them is the point of strangulation; it may be anywhere in the length of the intestine. Then, to open such a patient over the supposed point of strangulation would greatly complicate the case and leave the surgeon in doubt as to whether his patient had been relieved of his strangulation; for often in operating for strangulated hernia, I have had the intestines slip from the sac into the peritoneal cavity, and it was considerable trouble to get hold of the portion strangulated so as to examine its condition before closing up the abdominal cavity. Until the point of strangulation is found and examined, you can never be sure your patient is relieved of his dangerous condition.

Then, again, there is no better way to ascertain the obstructed side than through a median incision, both sides being within easy reach, so that they can be examined and dealt with with certainty. When the position of the strangulation is determined, it is an easy matter to cut down and release the hernia from its sac and return it to the inside, and bring the intestine to the median opening and there examine its condition, and if there is a show of returning life to the strangulated portion, then wash with warm water that has been boiled, and return to the peritoneal cavity with as little

delay as possible. The closure of the wound is of moment, for on the manner of doing this depends the success of a radical cure of your patient.

Leaving the sac outside in position, and taking a long, straight needle, and with two fingers in the peritoneum, push the needle through the abdominal wall, taking care to include all of its wall, so that when it is closed there will be plenty of tissue; it does not require to be very tightly tied, but just sufficient to make a perfect approximation. Before making your closure, trim up your sac and remove all portions thickened and diseased that could interfere with perfect union of the hernial wound.

The inside fingers act as a guide to protect the bowel and to aid to a proper placing of the sutures; and as the sutures are being tied assure yourself that all is clear and a perfect closure made. This can be determined with perfect accuracy.

The gaseous distention of the abdomen is a most serious complication; it offers many impediments to a proper diagnosis, and that it must be gotten rid of before the patient be relieved is admitted by all. Puncture through the abdominal wall with any instrument is dangerous in the extreme; to use a hypodermic needle would be a useless procedure, as much larger openings are required before the gas will be discharged. I have repeatedly tried to empty the bowel in this manner, and feel confident that it would require days to do so. An opening should be made with the knife or some instrument that will puncture the bowel, and the instrument then opened, stretching the bowel, giving exit to the gas. For this purpose I have had an instrument made almost identical in form with the little ear speculum, bringing the trumpet to a point, with which to make the puncture. The opening can then be stretched, and the closure will require only one stitch, while that made by a knife would necessitate several. I have used it only once. It answered the purpose admirably. As the needle rapidly enlarges from its point the bowel must be grasped by the fingers to prevent slipping while being dilated. Besides this advantage the instrument shortens the operation, lessens the shock, and prevents leakage. Comparing methods of treating obstruction of the bowel, there is but one treatment, that is to open the patient and correct the trouble—when I say that, I do not mean that there shall be a half-dozen consultations before this treatment is resorted to—and I will venture to say the mortality will be reduced from its present high figures to 15 per cent. Those credited cured by other methods in most instances

were mistakes in diagnosis. No one was ever killed or their danger increased by an exploratory operation.

Much of the recent work done in abdominal surgery has been by men who base their opinions on experiments on dogs. This work accomplishes only one good—it prepares the surgeon with manipulative skill and dexterity in operating. But this experimental or dog surgery has not a single feature in common with that on the human subject, for there is no resemblance either in the operation or the conditions present. The one is on a healthy animal with an intestine only one-third the length of the human, and used for the passage of the coarsest food and the most indigestible materials; with no nervous element to contend with, no pathological condition to contend with, no distention or delay, no previous shock or destruction of parts, no inflammatory element to remove, no complications to hinder or delay the operative work, no half-dozen consultations, no opium or belladonna previous to operative work —in fact, the one differs from the other as day differs from night. And it is these very conditions and complications and delays that make all the difference between life and death. Could we bring the profession to look at the conditions and dangers of peritonitis and obstruction of the bowel in its proper light, and have all such conditions treated at an early period, there would be some chance for the patient to recover from the mischief already done by the disease, for intra-peritoneal inflammatory conditions soon destroy life. The surgeon cannot do any harm nor add one feather's weight to the already dangerous condition, but with good work will save hundreds of valuable lives. Senn's experimental work on dogs was for a definite purpose, which he has beautifully set forth in his book, and clearly demonstrated to us all, and those of us who work in this field can only hope to be imitators of him.

Dr. Theodore McGraw, of Detroit, gives us a most ingenious method of managing some of the more desperate cases of intestinal obstruction. In complete gangrene of the bowel I imagine it will be of great service in saving life. In these cases we are compelled to make an artificial anus which will relieve the urgent symptoms of distention, with, at the same time, the rubber ligature recommended by Dr. McGraw passed through two or three inches below the artificial anus, through the upper and lower segments of intestine, including at least one and a half inches, and tied as tightly as possible, and the knot secured by ligature; then either a continuous or interrupted Lembert suture around this ligatured portion, and,

by the time the ligature has cut its way through, the union will be complete, without any possibility of leakage, and with but little delay or prolongation of the operation.

Complete exit will be given through the artificial anus to all distending gases and contents of the bowel, until the artificial opening is complete (which is three or four days), when the artificial anus can be closed by silkworm-gut sutures placed at the time of operation. This method also comes to our relief in obstruction of the gall-duct. In these cases the abdomen is opened, the gall-bladder emptied of its contents, the rubber ligature used to unite the intestine to the gall-bladder, with additional suturing of the peritoneal covering of the bowel and gall-bladder so as to insure perfect union, and in three or four days the abdominal wound can be closed with silkworm-gut sutures; the fistulous opening between the gall-bladder and bowel made by the rubber ligature will prevent many of the annoyances and inconveniences of having a biliary fistula.

It will in many ways answer a better purpose than the Senn method, but in the vast majority of cases Dr. Senn's method of anastomosis is our only one to save life; we cannot wait two or three days for an opening to be made; of necessity, therefore, we must resort to the method of Senn.

I have used Dr. Senn's method three times, with two recoveries, and must say I have more admiration for him and his work than any intestinal surgeon in the world.

I have found, in using the Senn plate or the Abbe catgut ring for intestinal anastomosis, that one of the greatest difficulties to overcome was the passing of the silk ligatures through the intestine, there being four or six of them in each plate or ring. When they were threaded in the ordinary sewing-needle they became entangled and greatly prolonged the operation, or, if they had to be threaded during the operation, it was the cause of considerable delay; and for a long time I have been trying to find a substitute that would answer the purpose without any of the objectionable delays. I have found the desired needle in the self-threading Supplee sewing-machine needle. In the use of this needle the operation is shortened at least four-fifths, all of the threads being passed rapidly and without delay.

The ring or plate placed in position, the operator holds the needle with the open face of the eye toward him, the assistant takes up the ligature, draws it taut at right angles to the needle over the eye, and it is at once threaded. The operator quickly passes it through

the intestine, half an inch from its cut border, and the assistant withdraws the ligature from the eye. The same process is gone through with all the sutures, and it is done in a moment, without delay.

"Ashhurst tabulated 57 cases of laparotomy for acute intestinal obstruction from other causes than intussusception, from which it will be seen that only 18 terminated favorably. At that time the mortality of laparotomy in cases of intestinal obstruction other than intussusception was over 68 per cent. Most of these operations were *performed without antiseptic precautions.*"—*Senn*, page 28.

I have had a greater number recover from this operation, and have operated for obstruction only 24 times, and always without antiseptic dangers—only clean Philadelphia water; 19 recovered.

Dr. Ward, of Topeka, Kansas, recommends a most ingenious method for finding the proximal and distal ends of the intestine. Pass the fingers directly down to the attachment of the mesentery to the spine, and the position of the two ends will be immediately established, as the lower attachment of the mesentery must of necessity belong to the lower end of the bowel.

DISCUSSION.

DR. JOSEPH PRICE: As I am quite familiar with what the author has said and done, I shall have little to say about the paper. The old classification of acute and chronic obstruction is quite sufficient for surgical purposes. I wish simply to call attention to a few points derived from my clinical experience. First, in regard to the causal relations which surgery bears to some forms of obstruction. The author has alluded to the reduction of hernia without the relief of the inflammatory adhesions causing strangulation. Only a short time ago someone presented to the Pathological Society a reduced strangulated hernia. It was fortunate for surgery that in that particular case a post-mortem was secured. I am satisfied that if more examinations were made in the fatal cases of hernia operation, reduced strangulations would be found frequently. My own practice is to open the sac and deliver the bowel and free it from all strangulating bands. If you simply sever the stricture either by the old or new method and do not draw the bowel out completely you will fail to recognize the constriction that commonly exists about its neck. I would make it an inflexible rule to expose the bowel in all hernia operations.

Again, those forms of acute strangulation due to bands about the appendix and the pedicle of removed cystoma, which in many cases are sequelæ of appendicitis or pelvic inflammatory trouble, and are not a very small or simple class of cases: Only two days ago I attempted to remove an abscess of the right ovary and tube and found overlying and fixed to these pus accumula-

tions all the ileum that could get into the pelvic cavity. I found complete strangulation of at least four inches of the ileum and perforation at two points—I mean complete as we commonly understand such strangulation from inflammatory thickening and kinking with fixation. In removing the bowel I laid open two cheesy portions of bowel, necessitating anastomosis and resection. It is in this class of cases that we lose our patients unless we complete the enucleation of such thickened and adherent bowel. The neglect of this is a common cause of death in pelvic inflammatory troubles. On two occasions I have had to reproach myself, notwithstanding I knew at the time of the sections, which were difficult and complicated, that I had not completed my work to my own satisfaction. In a few days I had cause to reopen both of these cases. I have now a patient in bed after the removal of the fused viscera of the pelvis, and I spent probably half an hour in the removal of the strangulated and adherent bowel. It was fused to that extent that it was impossible to see the mesentery on either side before freeing the adhesions.

Another class of cases is of interest in this connection because we have had so many new methods proposed for their relief. One of these methods, proposed by the Germans, is by removal of the coccyx and going in posteriorly and removing the pelvic mischief. Such a method must always result in neglect or non-recognition and non-relief of bowel complications above. The same serious objection applies to the recent French method of dealing with pelvic inflammatory troubles by the vaginal method of extirpation of pelvic viscera. If by this method we could deal with bowel adhesions I would welcome it, for in many forms of tubal and ovarian trouble we leave behind a great deal of filth when we permit the uterus to remain. Dr. Coe has reported ten cases of vaginal hysterectomy, two of which died of strangulation, I think in a short time after the operation. It is not improbable that in these cases tubal and ovarian disease with adhesions existed and that in the removal of the uterus the effect of these adhesions was increased. In a case yesterday where I removed the uterus for cancer, I found double hydrosalpinx with bowel adhesions. In this case I operated by the vaginal method and brought the bowel to the vaginal orifice to free it. If in this case there develops the slightest indications of bowel adhesions, I shall operate at once.

Again, there is a group of cases—obstructions due to bands of adhesions following the use of chemical solutions in abdominal operations.

GUNSHOT WOUND, WITH USE OF THE ELECTRIC PROBE.

By A. B. KIRKPATRICK, M.D.

[Read October 14, 1891.]

Mr. S. came to my office Friday, 3 A.M., October 2d. He was stage-manager for the Grand Opera Company, and is now dramatic teacher at the Penn Conservatory of Music. He returned from the theatre after attending to some business after the performance, and happening to think of a loaded revolver, he thought best to remove the cartridges. He believed he had removed the last one when his wife spoke to him and his attention was drawn from the revolver a moment, and in that instant it went off, and he received the bullet, thirty-two calibre, in the leg above the knee. The muzzle of the revolver was not more than six inches distant, and the trouser leg was blackened and scorched.

Mrs. S. urged him to go at once to the doctor, and supported and assisted him to walk the three squares. He was nearly exhausted by the time he reached my residence.

I gave him a stimulant and probed for the bullet. I thought I located it just above the patella on inner condyle of the left femur. The probing was very painful, and I was unable to get hold of the ball with the forceps. I did not care to give an anæsthetic and go on with the operation without assistance, so I put him to bed and gave him a hypodermic of morphine and atropine, and he slept until 8 A.M.

I sent for Drs. W. H. and C. B. Warder, and for an electric bullet-probe, which I had seen a day or two before. At 11 A.M. the doctors came, and Mr. Yarnall sent a man with the probe. Dr. Warder, Jr., etherized the patient, and Dr. Warder, Sr., enlarged the wound and searched for the bullet carefully. He found a rough spot on the condyle, where apparently the bullet had struck and roughened the bone, having then been deflected and passed into the popliteal region, as the course of the bullet had been downward, forward and outward.

Mr. S. is a bicyclist, and has a fine muscular development—the wound being over two and one-half inches deep. We were about giving up the search when I felt what was apparently a spicula of bone, and to determine the fact passed the electric probe down along my finger, and with considerable difficulty placed it on the rough point. The alarm sounded, and we were convinced that the point was a corner of the bullet. I enlarged the wound and found it so. The bullet was buried in the bone, and the peri-

osteum had closed over it, except a little corner as large as a pin-head, which had been turned up by the bone. We were not supplied with bone-chisel or gouge, and the bullet was below the surface of the bone, so forceps were of no use. I drew on the family tool-chest for a gouge and the kitchen for the potato-masher, which I used as a mallet, and chiselled the bone away on one side so that I could pry the bullet out. We syringed out the wound with bichloride solution, 1 to 4000, and Dr. Warder put in the sutures and a gum drainage-tube, covering the wound with iodoform gauze, and placed it in an improvised splint of trunk board.

The operation was long and tedious, and the patient did not regain consciousness until 3 P.M. He was too weak to remove from the operating-chair until 9 P.M., at which time he walked to the next room on crutches and went to bed.

In June he had suffered from functional disturbance of the heart from excessive smoking. He did not react well after the operation, and the heart was weak and irregular, so I gave hypodermics of strychnine and atropine, and inhalation of ammonia, and used hot-water bags. There was no vomiting. He had a temperature of 101° the evening of the operation and 102° next day; the third day 101°, and the fourth day normal. He required no anodyne whatever. The day after the operation I gave calomel, ipecac, and soda, followed by a Seidlitz powder, which moved the bowels freely. I also gave a five-grain powder of phenacetine every two hours until the temperature fell to normal.

The day after the operation I looked at the drainage-tube, and applied fresh gauze, and the second day syringed out the wound with bichloride solution, 1 to 4000. The morning of the fifth day the stitches were removed, and their place supplied by narrow strips of plaster. The patient sat up the sixth day, and I took him home the seventh day, and he has been walking around on crutches since. Yesterday was the eleventh day, and he was at a rehearsal, and expects to begin his usual work to-morrow evening. He kindly offered to come here to-night, and Mr. Yarnall is with us to exhibit the electric probe.

AN INSTRUMENT FOR MAKING APPLICATION TO THE UTERINE AND URETHRAL CANALS.

By A. B. KIRKPATRICK, M.D.

[Read October 14, 1891.]

For the past three years I have been working in the Philadelphia Medical Mission, and it has been necessary for me to do considerable gynecological and venereal work, minor operations for misplacements, endocervicitis, endometritis, lacerations, etc.

I have been experimenting to find a rapid, cleanly, and economical way of making applications to the endometrium and urethra.

I have used suppositories, tampons, and medicated bougies, only to be disappointed. To my mind the excipient in medicated bougies and suppositories prevents the absorption of the medicament by coating the passage, and when the suppository or bougie liquefies, by the heat of the body, the medicament is drained away from the location where placed and needed.

I began the use of powder by insufflation to the cervix and vagina several years ago, and for ulcerated conditions of the cervix it gives excellent results.

My first instrument, which I made myself over a year ago, was a hard-rubber insufflator tube with a wire wrapped on the extremity with thread. With this crude instrument I could push powder, boracic acid, iodoform, aristol, etc., into the cervical canal or urethra. At my request, last April, Mr. Yarnall made me this instrument, which originally had a copper wire for piston, tipped and packed like a hypodermic syringe piston, and in place of the finger

pieces, a half-inch hard-rubber collar. The copper wire bent, and stretched on straightening, and the leather packing was not clean or aseptic.

This improved applicator is made of a seamless aluminium tube with a steel piston aluminium-pointed, and steel finger and thumb pieces. It is very simple in construction and is easily used.

DISCUSSION.

DR. JOHN C. DA COSTA: The powder applicator presented shows how different people may arrive at the same conclusions without ever discussing the matter with each other. It is a capital little arrangement, but I have one that is precisely similar in principle, given to me some ten years ago by Dr. Ellerslie Wallace. One of his favorite applications to the endometrium was powdered sulphate of zinc, which he applied with the instrument. One reason why we often fail to get good results from ointments is that the uterine canal is sometimes covered with a glairy deposit of mucus. Before an ointment can come in contact with the membrane this mucus must be removed. A powder may act differently, for it is retained, and if soluble, will gradually melt and pass through the mucus.

DR. C. P. NOBLE: I wish to make a few remarks bearing on the general principle of the application of medicaments inside of the uterus. My own experience has led me to the conclusion to which the attention of the profession was called by Dr. Emmet, that applications inside of the uterus are very seldom indicated and that their field of usefulness is extremely restricted. I think that Dr. Emmet and his co-laborers have shown that the majority of cases of discharge from the uterus are not caused by inflammatory trouble inside of the uterus, but by disease outside of that organ, and, therefore, it is illogical to make applications to the interior of the uterus in the class of cases under consideration. Treatment of the causative lesions in these cases is much more satisfactory, less painful, and free from certain dangers which attach to applications to the endometrium—including uterine colic and salpingo-peritonitis. I am, however, quite satisfied that there are cases in which it is proper to make applications inside of the uterus, as, for instance, cases of purulent endometritis due to gonorrhœa, for example. In fungous endometritis, where the condition is not sufficiently marked to require the curette, applications to the endometrium are useful and will often effect a cure. In the condition formerly called endometritis, the evidence of which was uterine discharge, I take it that treatment of the endometrium is not indicated, and is harmful rather than beneficial.

INTERESTING CASES OF ABDOMINAL TUMORS.

By M. PRICE, M.D.

[Read October 28, 1891.]

Mrs. R. [Dr. Keller's patient], suffering from sarcoma of the left ovary. She has complained only for the last nine months, has rapidly lost flesh, and continuously enlarged from encysted peritoneal dropsy.

She gave a history of a tumor, and spoke of it as dropping from the right side to the left. The appearance of her face was that of one suffering from ovarian disease. There was in her diseased condition indications of more serious complications.

June 14th we operated for the removal of the diseased condition, and found encysted dropsy and sarcoma of the left ovary as large as a child's head, and, as the hemorrhage was so great from a slight examination, it was thought best to remove it, and it was done in as perfect manner as possible. The ligature of the pedicle controlled the hemorrhage perfectly; thorough washing of the peritoneal cavity; a drainage-tube at the lowest point from which the tumor was taken; careful closure with simple dry dressings completed the operation. The tube was left in four days; the patient made a rapid recovery from the operation.

I expect this poor woman to have her disease return, and that very soon, and could I have been perfectly sure of what the trouble was, I would not have operated. But when we do undertake anything for their relief, let us at least leave them in as good condition as we found them, and not with dangerous hemorrhage to destroy them in an hour or so, and all because we have not the courage to complete an operation we had the assurance to begin.

Present: Drs. Jos. Price, Morris, Murry, and Keller.

This patient was examined on the 25th day of October; she is perfectly well and doing her work, with no indication of a return.

Mrs. J. T. [patient of Dr. Hutzell]; this young woman, twenty-one years old, has been suffering for eight years from a complication of diseases which culminated in an operation for her relief. When she was fifteen years old she had a discharge from the navel of pus and hard calcareous matter; this discharge lasted some two years; she has not enjoyed a single day of perfect health for the last seven years, but has for the most part done her housework and assisted her husband in his laborious business for the last year, with a condition of things in her pelvis that is hard to imagine anyone walking about with, much less work. She only submitted to an operation because

Dr. Hutzell told her nothing else would help her to get well. Examination of the pelvis indicated pus and a general adherent condition of all the pelvic contents, so that I did not expect an easy removal of the diseased condition, but I was not prepared for such an uphill undertaking as I found was necessary for the relief of this most distressing case.

After the usual opening of an inch and a half, I found the pelvis blocked with a peritoneal cyst with dark and bloody contents; this was emptied and the contents of the pelvis at once investigated. Both tubes were diseased; the left with more than a pint of offensive pus, the right two or three ounces of pus, both adherent to all the surrounding viscera. The enucleation was most difficult from start to finish. In addition to the pelvic disease and the peritoneal cyst, there was a collection of large, hard concretions, some of them as large as a walnut, completely covered by folds of the bowels and the peritoneum.

In the removal of these concretions there was an additional risk to the patient, as they had to be removed from their bed. The bowel folded around them so that it was difficult to tell where to begin without opening the bowel. The effort for their removal consumed considerable time, but all were removed that could be found. Perfect irrigation of the entire abdominal cavity after most of the adherent bowels were torn apart. I say most of them, for it was impossible to complete the separation; they were so well formed that I considered it unsafe to do so much tearing in this complicated condition of affairs. Thorough washing, with the drainage-tube in the most depressed portion of the pelvic cavity, a complete toilet, and the patient put to bed. Time of operation, forty-five minutes.

She was by all odds the best patient I have had the pleasure of treating. She made a perfect recovery after one week of drainage, with not a single complaint from beginning to end.

Dr. Jos. Price's hospital, 241 N. 18th Street, June 10th, 1891.

Examined on the 26th of October; perfectly well; no pain; able to do all of her work with perfect comfort.

Supra-vaginal Hysterectomy.—Miss W. R., aged forty years, suffering from a rapidly growing hard tumor on the right side filling the pelvis. The cervix high to the right and above the brim of the pelvis, and a hard body the size and shape of the uterus. The tumor movable, all but the pelvic portion, which was apparently fixed. The patient was only aware of a lump in the side during the last two or three weeks prior to operation; she was sure it was not there a month. When I examined her the day before the operation, the tumor was as large as a womb at the seventh or eighth month of pregnancy, and nodular. She was incapacitated for work, and it was decided to remove it as its rapid growth indicated malignancy.

July 9th, with the assistance of Drs. Jos. Price and Morris, I removed the entire uterus and appendages, and left nothing but the cervix clamped by the Delta metal wire nœud, with dry iodoform dressings to finish the operation.

The tumor was a most interesting one, and in a great measure explains the history the woman gives of its rapid growth. In the pelvis there were three fibroids with all the pathological characteristics of tumors of that nature; the cervix to the right and high up, and the uterine canal not over three inches

long, enclosed by the large tumor to the right of the uterus, and front and back of it one of the little fibroids.

The large tumor was entirely different in all of its pathological appearances, and when opened had a distinct capsule, and when the capsule was opened widely gaped as if there were great pressure from within pushing out the muscular tumor, or I have no doubt a malignant and rapidly-growing tumor inside the capsule.

Examined by Dr. Bigelow: spindle-cell sarcoma.

Examined October 28th: at work, free from pain and in good health.

Miss M. D., aged thirty-two years, suffering from left ovarian tumor with myxo-sarcomatous contents. This young woman was accused of being pregnant by several well-known doctors who had treated her for several months. Patient submitted to an operation to remove the suspicion of her unchastity. Operation was an easy one and she made an uninterrupted recovery. Weight of tumor, twelve pounds, with contents.

Obstruction of the Bowel by Gall-stones.—Mrs. M., aged forty-five years, was taken on the 13th day of September with slight pain in the right side of the abdomen; on examination it was thought the area of dulness over the liver was considerably enlarged; had no increase of temperature or pulse. An effort was made to move the bowels, which was persisted in until the 17th. During this time ten calomel powders were given, four Seidlitz powders, two bottles of citrate of magnesia in divided doses, two ounces of Epsom salts, one drop of croton oil. There was no vomiting and no increase of pulse or temperature. The patient's condition was up to this time good, but a very anxious expression of the face was beginning to appear, and she wished something done for her relief.

Pulse beginning to show signs of weakening; no tympanites. At this time we thought something radical must be done to relieve the obstruction of the bowel. Gall-stone was not suspected. Ether was given. An opening directly over the region of dulness, two inches in length, was made, when a greatly distended gall-bladder was at once discovered, tapped, and the contents drawn off, which was a clear, gelatinous fluid; had none of the characteristic appearances of bile. The gall-bladder was examined, and two large stones and a small one removed.

The direct cause of the obstruction of the bowel was the pressure made by the distended gall-bladder with the gall-stones laying on the transverse colon. This pressure was made possible by the distention of the gall-bladder as it enlarged and was pressed backward by the abdominal wall, making pressure on the colon and causing the obstruction, which was as complete as any I have ever seen.

Drainage-tube placed in gall-bladder, which was securely stitched in upper angle of wound; two sponges had been placed in the peritoneal cavity to protect it from the discharges; these were removed and thorough irrigation of the abdomen was made. Silkworm-gut sutures; closure of the wound; dry dressings and bandage. The effort to move the bowels was continued until the third day after the operation, when a slight movement was obtained; flatus passed freely. On the fourth day there were free purgations after large and repeated doses of Epsom salts, both by the mouth and by injection. Injections were also used freely before the operation, as well as all the other

treatments. Calomel powders every twenty minutes; one dozen or more given. Patient made a most beautiful recovery and is now able to attend to her home as before.

Mr. G. C., aged forty-six years [Dr. Prendergast's patient], had been suffering for a long time, when making unusual exertion, with pain in the region of the head of the colon.

Four days before operation, while at Atlantic City, was taken with very severe pain in the abdomen; on his arrival at home his physician gave him small doses of mild chloride and soda, followed by Rochelle salts. He was freely purged and all the urgent symptoms relieved, but he still complained of pain at the head of the colon. After a careful examination, Dr. Prendergast decided that his patient was suffering from appendicitis or abscess at head of colon. Patient had quick pulse, subnormal temperature, distended abdomen, anxious countenance, and was a very sick man. At this time I was called in consultation, it being the evening of the fourth day of his disease. An operation was advised and consented to by the patient.

August 29th, at 8 A.M., ether was given. An opening one and a half inches inside of the crest of the ilium directly over the area of dulness down to the abscess cavity, was made, and from four to six ounces of pus and feces were discharged. The appendix was folded back, and to the outside of the colon, almost entirely separated from it by ulceration. The parts seemed to be so soft and gangrenous in appearance, that I thought it best to leave everything in position, use irrigation, two rubber drainage-tubes, and pack with gauze; but when I washed out the cavity I found that the slight barrier that had separated the abscess from the peritoneum had been broken, the intestines protruding through the wound. I at once decided to wash out the peritoneal cavity and use glass drainage into the pelvis, and dress the external wound as above stated. Three stitches were applied, but two were cut away that evening. Patient was freely purged the night before the operation, and began purging on second day, and continued naturally, four or five movements per day, until the fourth day; after that salines were given to keep the bowels free.

Patient made a beautiful recovery. For this result I am greatly indebted to his physician for his untiring care and attention and good treatment before, during, and after operation.

Mrs. J. W. H. [patient of Dr. C. H. Dunham, of Trenton. N. J.], suffering from extra-uterine pregnancy. Operation October 14, 1891. Recovery.

August 1st was taken with very severe pain on left side, accompanied with diarrhœa; she was four days over her expected period; while at stool felt severe pain in lower left side of abdomen, and immediately became sick at the stomach and faint. Her period made its appearance at this time and continued for three weeks. This is her statement of her condition. She was attended for nine weeks by a practitioner unknown to me, and had frequent recurrences of her first attack. When Dr. Dunham was called to her assistance, she was having daily chills with other symptoms of peritonitis, also a tumor filling the abdomen as high as the umbilicus. At this time Dr. Dunham telegraphed me he had a case of extra-uterine pregnancy, and asked me to come prepared to operate. I went to his assistance October 14th, and found the patient in bed, perfectly comfortable, without any indication

of trouble, owing to free purgation which the doctor had given her preparatory to operation. The increase of pulse and the tumor remained as proof of the correctness of the diagnosis.

A small incision was made in a thickened and much changed peritoneum, immediately on the opening of which great quantities of very offensive blood was discharged from the abdomen. Instant search for the impregnated tube was made; brought up, and ligated. Thorough irrigation and drainage; the latter was continued for four days. Great, broad flakes of inflammatory lymph were removed from this cavity. At the time of operation there was a distinct inflammatory diaphragm extending from crest of ilium to crest of ilium, leaving a large cavity lined with this product, which would not permit the internal viscera to return to their place; this cavity was filled with boiled water. Not a single bad symptom; an uninterrupted recovery.

Married two years; no children.

Mrs. A. G. B. [patient of Dr. C. H. Dunham, of Trenton, N. J.; his second case of extra-uterine pregnancy in five days], suffering from extra-uterine pregnancy. Operation October 19, 1891. Death.

Patient is thirty-six years old; has three children; eight years between first and twins twenty months old. She passed one period August 8th, and September 6th had a slight discharge, pale in color. One week later had severe hemorrhage with pain and symptoms of miscarriage; persistent diarrhœa with sick stomach; felt weak and faint. A rupture at this time had unquestionably taken place; hemorrhage continued, with recurring attacks of pain. The doctor had made his diagnosis early in the case, but free purgation had so relieved her that he was persuaded to delay; but her condition continuing to grow worse—pulse 130, temperature normal, patient very pale, a decided boggy feeling in the pelvis, and hardened masses in the abdomen—decided him to have an operation, and he asked me to see her and operate at once. Through a small incision I opened the peritoneum. The abdomen was full of fluid and clotted blood to the diaphragm; no odor; no indications of peritonitis. I immediately removed the impregnated tube, which was on the right side. The fœtus was also found by Dr. Dean, of Spartanburg, S. C., who was assisting us. The blood-clot was adherent to every portion of the peritoneum, and to the anterior and posterior face of the omentum. It could not be removed by flushing or scraping. A large conical clot, as large as my two fists, extended down by the rectum. All the clots and free blood that could be washed out, using three large pitchers of water, were gotten rid of. After free irrigation the peritoneum had anything but a comfortable appearance, as it was perfectly black from adherent blood-clot. There was no odor to the blood, no apparent chemical change having taken place. As to the purging in these cases, I have no doubt it is from the pressure of the clot on the rectum. The absorption of most of the fluids and saline constituents of the blood may have some effect to increase the diarrhœa. The tenesmus and straining at stool unquestionably increases the loss of blood, greatly increasing the danger of the patient.

A seven-inch drainage-tube was left at the lowest point of the enucleation, and the top of the tube just reached the abdominal wall. Boiled Trenton water was used for irrigation, and about one quart was left in the peritoneal

cavity. Twenty-four hours after operation the pulse was 120, and temperature 101½°. Heart-clot feared, otherwise patient doing well.

Death from heart-failure three days after operation; patient was too comfortable to do well from the beginning.

DISCUSSION.

DR. B. F. BAER: I have been much instructed and interested in this report of the cases of Dr. Price, and I was especially interested in the case of sarcoma. I have had five cases of fibro-sarcoma, and in none of these cases has the disease returned. One was operated on two years ago, another a year and a half ago, and the others at a more recent period. These were solid tumors. One weighed fifteen pounds, another nearly that, and a third five pounds. They were surrounded by peritoneum, but there were no papillary growths. I would infer from the report that in the case of Dr. Price the tumor was breaking down and papillomatous.

I have recently had a rather rich experience in regard to difficulties in the diagnosis of pregnancy. The most difficult operations that I have done in the last two years have been done in the past two months, in neglected cases diagnosed as pregnancy. One was a case of poly-cyst of the ovary in which the physician was so certain of his diagnosis that the pains of which the patient complained were regarded as labor-pains, and on two occasions the bed was made up for the accouchement. When the patient was *in extremis* it was decided that she was not pregnant. In this case the adhesions were frightful, and the operation was very difficult.

The second case was operated on a week ago, and the tumor weighed about sixty pounds. The patient was thought to be illegitimately pregnant, and was sent to this city two months ago, to be confined away from home. She went down hill very rapidly. Two or three of her physicians thought that she was pregnant, but in this instance, as well as the first, the mistake was due largely to carelessness. They took it for granted that she was pregnant, and did not examine carefully. She was the weakest patient on whom I ever operated. There were firm adhesions to the liver, and I think a piece of the liver was torn off. The adhesions were universal, and the tumor was removed with difficulty. So far the patient is doing well.

DR. JOHN C. DA COSTA: I might speak of one recent case of interest in the matter of diagnosis. The patient was a woman forty-six years of age, who presented the symptoms of fibro-cystic tumor of the uterus. The only point against this view was the comparatively rapid growth of the tumor. There were two or three able men with me at the time of the operation. I found two tumors. The first one was enucleated, and seemed to be a true fibroid. The second looked like a fibro-cystic growth, but when it was cut open it was found to be a fibro-sarcoma. Hysterectomy was then done, and the uterus was found to be filled with sarcomatous tissue, although there had been no evidence of uterine sarcoma. Here we had three different conditions, two malignant and one non-malignant, but capable of change—sarcoma of the uterus, fibro-sarcoma, and fibroid.

DR. JOSEPH HOFFMAN: A point brought out by Dr. Da Costa's remarks is that a deferred operation is a dangerous one, because in all of these growths, especially those of a fibroid nature, degeneration is apt to go into something malignant. Sarcoma may take any form known to pathologists. Delay is, therefore, dangerous, and the idea of melting out tumors which are already practically on the road to malignancy by any means except radical removal is foolish, and not supported by the clinical facts. I know of one case of mistaken diagnosis of pregnancy for ovarian tumor, by which, after a very minute examination, the woman was put in the Episcopal Hospital, and allowed to remain three or four months in order to confirm the diagnosis, although the diagnosis had been made. Where the uterus can be felt outside of a fibro-cystic tumor, I do not see how a mistake can be made. In obscure cases it is better to see what we are about by an exploratory operation, than to make a diagnosis and hold on to it until time shows that we are wrong.

DR. WILLIAM E. ASHTON: The danger of fibroids undergoing malignant change is an argument in favor of their early removal. In the majority of cases, however, it is impossible to urge early operation on account of the past education of physicians. We have been taught that fibroid tumors are of an innocent nature, and that when the woman reaches the menopause they will undergo certain changes which will result in the patient's recovery. I find, however, that the vast majority are not affected by the change of life. I think that in most cases in which oöphorectomy has been done in the hope of bringing about an early menopause, the results have been unsatisfactory. Another point is that a large number of these cases have diseased appendages. Many of these cases suffer pain, and this has been ascribed to pressure, but I think that this pain is due in many instances to localized attacks of peritonitis due to the diseased condition of the appendages. Taking into consideration the fact that there is danger that the growth will become malignant, and the fact that the appendages are usually diseased, I think that it is the duty of the profession to educate the coming physician in regard to the necessity of the early removal of fibroids.

Dr. Price, in his case of appendicitis, refers to the adhesions being frail, and not trusting them. I think that if there is any doubt as to the pus being excluded from the peritoneal cavity, we should not hesitate to flush the abdominal cavity and drain. In a case on which I operated some time ago, and in which the head of the colon was ulcerated through, I had the same difficulty. I got into the abdominal cavity and found pus. With thorough irrigation and drainage there was complete recovery.

DR. ERNEST LAPLACE: I was interested in the apparent triple nature of the growth in Dr. Da Costa's case. A word or two will explain this. The growths started as fibroid tumors. The life of this fibroid tissue may be longer or shorter. As soon as it dies it disintegrates and softens. The apparently triple nature of the lesion was due to the growths being of different ages. The growth that had retained its integrity was the youngest, and the others were older, and had undergone degeneration.

DR. FRANK WOODBURY: In connection with the remarks just made in favor of operative treatment in uterine fibroids, I might refer to one patient whose history shows that circumstances alter cases, and that it is difficult to lay down any general rule that will cover every individual instance. This

particular patient has been under my observation nearly twenty years. In 1874 I was called to see a colored woman, about twenty-four years of age, who had almost continuous menorrhagia. She suffered with pain, obstruction of the bowels, and difficult micturition. Examination showed a hard cervix with the uterus enlarged and firmly adherent, occupying nearly the whole upper part of the pelvis. I treated her on common-sense principles, inserting Barnes's rubber air-bags back of the uterus, inflating them twice a day until I had stretched the adhesions, and lifted the uterus out of the canal into the abdominal cavity. She became much more comfortable, and for a year continued the use of ergot and chloride of ammonium alternately. After freeing the uterus I introduced a rubber ring pessary inflated with air. She became greatly improved and passed from under my observation for some two years, when she returned with leucorrhœa. I found that the pessary had ruptured, and was almost imbedded in the vaginal tissue. I removed the remains of the pessary, and found a cicatricial ring forming a support for the uterus. The patient again disappeared, and was not seen until a year and a half ago, when she sent for me. She was then suffering with an acute attack of pain in the abdomen—probably something analogous to the pleuritic stitches which occur in old cases of pleurisy. An able physician had seen her and decided that she was pregnant and in labor. The uterus had steadily increased in size and was much denser than before, and bosses could be made out on the surface. On one occasion I remember that I had a member of this Society, an excellent surgeon and pathologist, examine the patient with me, and he pronounced it a case of sarcoma on account of the stony hardness of the cervix. I subsequently had a consultation with Dr. T. Betton Massey, a fellow-member, well known to us all as an expert in electro-therapeutics, in regard to the applicability of electrolysis to the growth. At this time I tried to introduce an exploring-needle into the growth through the abdominal wall, but found the tissue almost like bone; subsequently I turned the case over to Dr. Massey, who treated her with excellent results by the Apostoli method. Under this treatment the tumor has become distinctly smaller. She now suffers no pain or inconvenience, and menstruates without difficulty. As I stated at the beginning, I regard this as an exceptional case; but, on the other hand, I am not as yet quite prepared to subscribe to the propriety of performing laparotomy in all cases of fibroma uteri.

An interesting point is that in 1874 she was willing to have the uterus removed, and indeed suggested the operation to me, but as I was able to afford her relief without it, I dismissed it on account of the risk; moreover, these operations were not as familiar to us then as now. Her general health has been very good, she has suffered very little, and during these many years she has been comfortable and able to earn her living by housework. The notes of the case may be found by consulting Dr. Massey's book.[1]

DR. CHARLES P. NOBLE: I wish to say a few words on the subject of the diagnosis of pregnancy. I think that there are cases in which the best of men may make a mistake in diagnosis as to the presence or absence of pregnancy. These are cases in which the pregnancy is complicated by a tumor, or cases in which the position of the uterus is altered, and in which the pelvis is more or less filled with inflammatory masses. I have myself seen one case in which

[1] Electricity in Diseases of Women, 2d ed., Phila., 1890, p. 147.

I made a correct diagnosis at the fourth month of pregnancy, and after watching the case for two months gave up that diagnosis. It was afterward demonstrated that she was pregnant. The diagnosis in the first place was made partly from the physical signs and partly from the history, which was one of arrested menstruation for four months. There was a pelvic tumor continuous with the cervix, occupying the pelvis—apparently an adherent retroflexed pregnant uterus. After watching the case for two months, and finding that I could not hear the fœtal heart-sounds nor detect the intermittent contractions of the uterus, which should always be felt at this time, I gave up the diagnosis and she passed from under my care. I learned that an autopsy made later showed that the woman was pregnant, and had a tumor of the anterior wall of the uterus, which prevented one from hearing the fœtal heart-sounds and from feeling the intermittent contractions of the uterus. I can easily see how one might make a mistake where there was a uterine or other tumor in front of the uterus, but feel satisfied that if the cases are carefully investigated, mistakes of this kind will be very infrequent. It would be a great advantage to every practitioner if, when engaged to attend women in confinement, he would take every reasonable opportunity to become familiar with the feeling of the pregnant uterus. This is not only a great advantage to the pregnant woman and to the practitioner in the immediate case, but it also educates the physician to distinguish between different conditions in the future. Such a course would enable the practitioner to recognize deformities of the pelvis and malpositions of the fœtus, and prepare for the proper treatment, and to become acquainted with the rhythmic contractions of the uterus. The only circumstances in which error might arise would be in cases of retained menstrual fluid, where the history would put you on your guard, and in some muscular tumors of the uterus which are said to present more or less typical intermittent contractions. Broadly speaking, when we have an abdominal tumor presenting rhythmic contractions, we can be satisfied that we have to deal with pregnancy. This sign is more reliable than the fœtal heart-sounds for the reason that, if the fœtus is dead or there is a large amount of liquor amnii, they are not to be heard.

DR. JAMES COLLINS: After the rich experiences brought forward on the other portions of Dr. Price's paper, I feel that I may detain you for a moment with a reference to the case of impaction of gall-stones. These cases, I believe, are more frequent than one would suppose. I am glad that Dr. Price has given his experience. I recall two or three cases, and one especially, in which, after a long struggle and threatened obstruction of the bowel, a gall-stone the size of a pigeon's egg was passed, and the patient was relieved. In another case I begged the consultants to permit the abdomen to be opened, but they would not agree to it. At the autopsy we found that a large gall-stone had formed; that adhesive inflammation had taken place between the gall-bladder and intestine; ulceration had occurred, and then the stone had entered the bowel and lodged in the ileum, causing complete obstruction. This case occurred ten years ago. I have seen another autopsy in which a similar condition of things was found. I believe that this happens not infrequently.

DR. MARIE B. WERNER: The treatment of ectopic gestation has always interested me greatly. In discussing this subject with Professor Winckel, of

Munich, I found his favorite way of treating it was with one to three injections of morphia (0.05) into the amniotic sac, feeling confident that absorption will take place. I asked him what he did in case of hemorrhage. He replied that the blood could be disposed of by the peritoneum. Subsequently, in conversation with Dr. G. G. Bantock, of London, in regard to the disposal of the blood, I learned that he considered operation imperative. He believed that the blood would not be entirely absorbed, but that portions would become organized and produce adhesions, provided the patient escaped death.

One of the cases reported by Dr. Price to-night clearly shows that Nature would have been unable to dispose of the blood, since omentum and intestines were so completely covered with clots that he found it difficult to separate them, and proves to me that, aside from arresting the flow of blood, the necessity of cleansing the peritoneal cavity of foreign matter is distinctly called for.

These points have been of interest to me, and I thought that they might be of interest to the Society.

THE PRESIDENT: I have been especially interested with reference to the tumors of supposed malignant nature in the abdominal cavity. The fact that we often make diagnoses of malignant disease which are not substantiated by the subsequent histological examinations must be borne in mind. I am reminded of a case which occurred in my practice two years ago, where there was an abdominal growth which I believed to be a malignant tumor of the colon. On making an incision I came down upon a growth attached to the internal surface of the abdominal wall, and, cutting through it, I found that it was a large growth of the omentum adherent to many coils of intestines. I felt sure that it was a sarcoma. I removed it as thoroughly as possible, probably getting it all away. It was referred to a competent pathologist, and found to be simply a lipoma of the omentum. I had assisted a friend a few weeks before to remove a tumor almost identical in appearance, and this has shown itself clinically to be malignant. The determination of the question whether or not these supposed cases of malignant disease are really malignant or simply a softening, or colloid degeneration, of tumors of a hard nature, is, I think, important.

DR. WILSON BUCKBY: Twenty-one years ago a bit of information was given me by Dr. Atlee, who may be said to be the Father of Gynecology, notwithstanding the pioneering of McDowell. He said that menorrhagia was due in ninety-nine cases out of a hundred to the presence of fibroid tumors, and that in the early stages they were amenable to medical treatment, and that the degenerative processes which take place are due to the neglect of the proper medical treatment in the early stages. I called him in consultation in a case of extreme menorrhagia, where the woman was almost exsanguine. He advised me to use sea-tangle tents, as was then the custom, and to make a thorough application to the interior of the uterus. He held that nine times out of ten the fibroid tumor was capable of being absorbed by his stimulating application, which consisted of compound iodine, iodide of potassium, and carbolic acid in glycerin. This was swept over the interior of the womb, and internally was given the old-fashioned ergot. My experience has been that in many cases this treatment will enable you, with benefit to the patient, to delay surgical interference.

DR. PRICE: In regard to my case of sarcoma, I would say that spindle-celled sarcoma is one of the most benign tumors of the uterus. I have had a number of cases, some of which were operated on a number of years ago, and they are absolutely free from disease. The tumor which I have reported was entirely of a different nature; it was attached to everything in the pelvis. The least touch would cause bleeding, and you could scrape out great handfuls of brain-like tissue. It was impossible to remove it all, on account of the adhesions. All that could be removed with care was taken away, and the patient is doing well. I do not believe that she will remain well. Fibro-sarcoma or spindle-celled sarcoma of the uterus is a very curable disease, and almost invariably is non-adherent. When removed it gives no further trouble.

In regard to the question of concealed pregnancy, I would say that in neither of the cases I have related did the physician examine the patient at all. Most of us in treating these cases treat them by simply looking at them without any examination; but if we attempt to do this kind of work, I think that we should go to the bottom of the condition. I do not believe that there is such a thing as concealed pregnancy—such a thing as a child of any size in the uterine cavity or outside of it. It is not our duty to find it. If there is any question of doubt, we should wait until sufficient time has elapsed, for pregnancy, unless of the extra-uterine variety, gives no urgent indications for interference. The case referred to by Dr. Noble is one in which both the mother and child were sacrificed by attempting to remove what was thought to be an ovarian tumor. A little delay would have rendered the diagnosis clear.

I agree with Dr. Ashton in regard to appendicitis. I am confident that we are too timid in these cases. If there is the slightest shadow of a doubt as to the septum between the abscess cavity and the peritoneum, it is our duty to break through and irrigate the whole peritoneal cavity. I have seen my brother operate for appendicitis five times through a median incision, tearing away all the adhesions and doing a complete operation. In the case I have reported, I tried to avoid opening the general peritoneal cavity, but when I passed two fingers to irrigate, I found that the peritoneum was opened, and I therefore loosened up everything and washed out the peritoneal cavity, and the result was favorable. A physician in this State was taken ill and appendicitis was suspected, but a delay of twenty-four hours was advised in order to clear up the diagnosis. The diagnosis was cleared up by the man's death inside of that time. If you suspect appendicitis, explain clearly to the patient the condition you suppose to exist and the danger of the two methods of treatment—the delay method and that by exploratory operation. An exploratory operation under proper surgical methods, with absolute cleanliness, has no business to cause more trouble than a simple vaccination.

Now in regard to hysterectomy. If there is a suspicion of malignancy, it is our duty to remove the uterus. If the tumor is a pure fibroma and the woman is near the period of the change of life, it is our duty to let it alone. At the change of life the tumor undergoes retrograde changes. The same occur where the appendages are removed. In nine cases out of ten, the appendages are diseased and they supply the stimulation to the growth of the tumor. The removal of the monthly congestion removes the cause of the

growth, and at once you have a cessation of the growth of the tumor and the commencement of retrograde changes. The operation of the removal of the appendages is wholly useless in œdematous fibromas and fibroids undergoing cystic degeneration. In such cases it is folly either to wait or to remove the appendages; hysterectomy is the only treatment.

Dr. Collins has beautifully spoken my mind on the subject of gall-stones. In my case the transverse colon was immediately under the tumor and there was nothing to hinder the occurrence of adhesions, ulceration, and the discharge of the stone into the bowel; but in many such cases the patient will probably die from leakage into the peritoneal cavity. The ulceration may be outside of the position of the bowel, and it is our duty to open the abdomen and take out the stones.

A word as to the method of treatment mentioned by Dr. Buckby as having been recommended by Dr. Atlee. I have a supreme admiration for Dr. Atlee and the whole Atlee family. They have done more, with McDowell, for woman-kind in this land than any others, and have established on a firm foundation a condition of surgery that to-day, even in my own hands, has saved more than one hundred lives. The kind of fibroids that will be relieved by such treatment are not fibroids. They are either badly treated abortions or granular conditions of the endometrium: a condition that can be removed by the curette. Such a uterus is as smooth as a ball. It is not nodular.

I could wish no better example than the case cited by Dr. Woodbury as proof of the value of operative treatment. This poor woman was an invalid for twenty-two years, and was then treated with electricity by Dr. Massey—driving an electrode through the abdominal wall into the tumor. This is not Apostoli's treatment, and I congratulate Drs. Woodbury and Massey that they did not have a death instead of benefit from the treatment.

THE SIMPLE EXTRACTION OF CATARACT.

By EDWARD JACKSON, M.D.,
PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC AND SURGEON TO WILLS EYE HOSPITAL.

[Read October 28, 1891]

THE old flap-operation for the extraction of cataract, when it was successful, was one of the brilliant triumphs of operative surgery. The trouble with it in the old time, before the day of Graefe, was, that it was successful in only a minority of cases. The real achievement of the last few years with reference to it has been the increasing of the percentage and the perfection of its successes, until they have surpassed anything achieved by other operations for cataract extraction. This has been brought about by collateral advances in medicine and surgery, that have given us an understanding of sepsis and asepsis, of the myotic power of eserine and its allies, and of the anæsthetic and other powers of cocaine.

My purpose in this paper is to discuss the operation of "simple extraction" as I practise it, with the reasons for choosing certain procedures rather than others, and some comparison of the results of the method with modified linear extraction, or modified Graefe method, which it has largely replaced.

The corneal section is made upward, mainly because it seems to me that the wound in this position is much better protected beneath the closed lids from either infection or the relative displacement of its lips than the downward section can be. It is made in the clear cornea, sometimes as close as it can be to the limbus without encroaching on it. It is parallel to the corneal margin, the plane of the knife making it being parallel to the plane of the periphery of the iris. It is made to include nearly, and sometimes quite, half of the circumference of the circle of which it is a part. The exact position of the section and its length are determined by the size of the cornea and the supposed size of the lens. The plane of the section should be well in front of the iris, for the risk of prolapse of the iris is thereby

greatly lessened, yet the incision must be long enough to permit the escape of the lens. The section is made with the knife described by me in the *American Journal of the Medical Sciences* for March, 1889, for the reasons there given, that it combines to a large extent the manageableness of the Graefe knife with the smooth incision of the Beers knife. Usually the incision is almost completed by the forward thrust, the cutting edge being carried by it out of the anterior chamber, and the remaining bridge of corneal tissue severed as the knife is withdrawn.

The capsulotomy is made with the point of the knife used in making the corneal section, and is about in the plane of the corneal section, as the lens lies against the cornea after the escape of the aqueous. I have in a few cases opened the capsule before completing the corneal section, as the point of the knife was carried across from the puncture to the counter-puncture. This was done in the fear that after the escape of the aqueous the pupil would contract so that it would be difficult or impossible to make a sufficient laceration of the capsule without wounding the iris with the knife-point. Such a manœuvre, however, required a slight change in the direction of movement, and prolonged a little one of the most critical periods of the operation. It was given up on finding that a sufficient opening in the capsule can always be made through the pupil after the completion of the corneal section. The opening that it is necessary to make in the capsule is really quite small, a slit 4 or 5 mm. long is quite sufficient, probably because, when the solution in the continuity of the capsule is once started it extends quite readily, as widely as it is needed, under the pressure of the lens during the stage of its delivery.

The advantages of this method of opening the capsule are that by it we get rid of one instrument, the cystotome—an instrument hard to keep clean at the shoulder from which the pricking point projects, hard to get and keep perfectly sharp, liable from its shape to catch and damage the cornea or iris in case of sudden movement while it is in the eye, and which I have seen more than once, by its direct backward pressure, dislocate the lens and allow the escape of vitreous. Then the small opening in the capsule nearly in the direction of the corneal section, seems to have a decided influence in making sure of the proper rotation and presentation of the lens in the corneal wound; and cortical matter as well as nucleus has a perfectly direct avenue of escape; and if cortical matter remains after the nucleus has been extracted, it remains inside the capsule, and not in the anterior chamber where it would exert its well-known deleterious influence on the iris; or,

as some have supposed, furnish an especially favorable culture-medium for the pathogenic bacteria introduced on the shank of the cystotome or along a path of capsule incarcerated in the corneal wound. Again, with this method of opening it, there is no chance that portions of the capsule will prolapse or become incarcerated in the wound, and so complicate the healing and endanger the ultimate result more insidiously, but quite as seriously, as prolapse or incarceration of the iris.

This method of opening the capsule has this disadvantage, that when the pupil contracts, as it does in the process of washing out the anterior chamber, the iris sometimes entirely covers up the rent in the capsule and makes it much more difficult to dislodge any remaining cortical matter. Under these circumstances, it is best to make no effort to dislodge it, for, in my experience, cortical matter *left within the capsule* after the removal of the lens nucleus is innocuous, and is certain to be removed by absorption in a few weeks at the furthest, causing some delay in the full restoration of vision and detracting from the brilliancy of the operation, but in the end giving the patient the best result.

The delivery of the lens is effected by making pressure with a lens spoon backward on the lower portion of the cornea, and with a corneal spatula slightly downward upon the upper ciliary region, causing the lens to push into the pupil and engage in the corneal wound, the movement of the lens being steadily followed by a slight upward movement of the spoon, and the necessary pressure never relaxed until the greatest thickness of the lens has passed through the corneal section. It is of the utmost importance that the pressure be maintained steadily; any intermitting of it that causes the lens to alternately advance and retreat is liable to bring about the displacement of the lens, and the presentation of the vitreous in its stead. After the nucleus has escaped, the pressure is gently continued until any evident masses of cortex have also been extruded, and then withdrawn.

Washing out of the anterior chamber I have practised after the method and with the apparatus of Dr. Lippincott, of Pittsburg, for the last year, as the principal step in the operative toilet. If the iris has prolapsed, the stream of boric acid solution is the simplest and best repositor, its effect being to carry the iris into position, and at the same time to provoke a marked and very satisfactory contraction of the pupil. If the opening in the capsule remains freely accessible, the current may be directed into it and all lenticular *débris* removed.

But if this is not readily accomplished, I content myself with a thorough washing out of the anterior chamber, at the end of which the pupil is found small and central, stroking of the iris with the spatula, or poking into the angles of the corneal wound to dislodge incarcerated iris or capsule, being thus dispensed with.

Eserine is instilled after the washing of the conjunctival sac, although usually the effect of the irrigation of the anterior chamber has been to already secure a small central pupil, in order that this contraction of the pupil may be maintained and the iris drawn as far as possible away from the cornea. In a single case in which I omitted the use of eserine a slight prolapse of the iris appeared at the end of thirty-six hours. Eserine was then used, and the prolapse promptly reduced. Later, however, it again appeared, and the pupil was left somewhat distorted.

Simplicity. As compared with the Graefe method and its modifications, "simple extraction" deserves its name, in that the iridectomy that it dispenses with is the most painful and one of the most delicate portions of the former operation, and that the uninjured iris is more readily reduced and kept wholly within the eye than the iris that has lost the tensile action of its sphincter. It prevents the extremely insidious accident of incarceration of the capsule. Again, the dangers of that serious complication, prolapse of the vitreous, are reduced to a minimum. Without rough handling, or especially unfortunate movement of the eyeball, it is scarcely possible for this accident to occur before the nucleus is delivered. Even in a case of dislocated lens with fluid vitreous the delivery of the lens was readily effected without the use of a spoon or loop, and no vitreous was seen until this had been accomplished.

Ease. The statement is usually made that with simple extraction the delivery of the lens is slightly more difficult. But, in my experience, this is true only to a slight extent as to the complete removal of the cortical matter. The delivery of the nucleus is not to any notable extent more difficult. I operated yesterday on a case where the lens was particularly large and the cornea small. From the other eye, in which the conditions were precisely similar, I had removed the lens several months ago, after a preliminary iridectomy, with a good deal of difficulty. The simple extraction was, if anything, the easier one. After the first operation a considerable amount of cortex remained in the capsule, and the same thing occurred with the second. Still, the removal of all remaining cortex is, I believe, a little more

difficult after the simple extraction, though certainly not more dangerous.

Prolapse of the iris. The danger of this complication is the greatest drawback on simple extraction—about all that keeps it from being an ideal operation. When any considerable prolapse occurs it causes a distorted pupil, is liable to delay the healing, is followed by unusually high astigmatism, and if very large might endanger the eye. The impression is abroad that it is very much more likely to happen after simple extraction than after extraction with iridectomy; at least, it is scarcely counted as one of the risks of the latter operation. But iridectomy does not prevent the occurrence, except of the part of iris that has been removed. Indeed, in so far as it removes the restraining influence of the iris sphincter and leaves angles of iris floating within the eye, iridectomy directly favors incarceration, the form that prolapse assumes after it. Knapp has recently reported statistics of about five hundred cases of simple extraction, with prolapse of the iris in eight per cent. of the cases. It is probable that incarceration of a part of the iris at the angles of the wound is about that common among Graefe's extractions. In my own work prolapse has not been more common after simple extraction than was incarceration after iridectomy. More than this, the great mass of cases of prolapse under the use of eserine flatten down and cause as little trouble as the incarcerations after iridectomy, and do this without excision or any other special treatment, without notably delaying the healing, and so far as can be judged without any additional ultimate danger to the eye. I speak thus particularly about prolapse of the iris, for it was fear of it that kept me for a considerable time from giving up iridectomy. Still prolapse of the iris is the chief danger of the method, and it should be carefully guarded against by the use of eserine, by keeping the patient as quiet as possible, by avoiding any pressure of the dressing or through the dressing on the globe, and by placing the corneal section as far away from the iris as possible, compatible with making it large enough to permit the escape of the lens.

Visual acuteness. The principal advantage of the simple operation is the exclusion from the eye of a large amount of very imperfectly focussed light, and the retention of the power of adapting the eye promptly and fully to the varying intensity of the light to which it is exposed. This advantage, although shown partly by statistics of visual acuteness, can never be fully exhibited in that way. An eye may be able to decipher even the smaller test-types, although their image on the retina is engulfed in a flood of unfocussed light coming

in through distorted portions of the cornea opposite the coloboma left by an iridectomy. But even with only the ability to make out the same type, the vision secured by the exclusion of this useless and confusing excess of light is for all practical purposes far superior.

Again we find in age the retina habitually guarded against even the light admitted to the younger normal eye by a diminished pupil; and the reversal of this, the flooding of the senile eye, with its slower nutritive processes, with an amount of light largely in excess of what it has been accustomed to, especially the crippling of its power to defend itself against sudden increase of illumination cannot but diminish its power of resistance to unfavorable influences, and lead to ultimate deterioration of vision.

It was watching the gradual deterioration that occurred in certain eyes that had been subjected to extraction, with iridectomy, that first made me desirous of trying the simple method.

Indications for iridectomy. I am not aware of any operator who proposes the abandonment of iridectomy in all cases. It is pretty certain that in at least one class of cases all will continue to practise it, namely, those in which from iritic adhesions or from other causes the pupil is extremely rigid and undilatable. The other indications for it are not so well agreed upon, but probably one of the most important of them is extreme restlessness and insubordination on the part of the patient. All of my cases of prolapse have been in patients markedly of that character. For the present most of us will be apt to fall back on iridectomy for a number of reasons, as I did in a case about a week ago where there was reason to suspect a large lens and saccharine diabetes, so that I feared sloughing from a large corneal flap. But with myself, as with many others, the present tendency is to do iridectomy less and less frequently, and it is probable that the cases in which it is either necessary or desirable will ultimately be found to be few and far between.

DISCUSSION.

DR. PETER D. KEYSER: It is always interesting to hear of successes and of methods, but the term "simple extraction" is not appropriate as applied to the operation described this evening. The proper designation would be "extraction without iridectomy." This is going back to original methods, first practised with a simple lance, and which often resulted in prolapse of the iris. To obviate this Beers's knife was devised. The occurrence of prolapse also led to Graefe's method of modified extraction with iridectomy.

In this way the lens escaped without unduly stretching the iris. The operation of extraction of cataract demands as much judgment as any operation in surgery. It is necessary to examine the lens and the iris carefully. If the iris does not react freely to light, showing that the tissue is inelastic, iritis is very liable to follow operation, unless iridectomy be done. In such case I precede the operation some weeks by a preliminary iridectomy. In properly selected cases, however, extraction without iridectomy is to be preferred, and in washing out the anterior chamber the use of very weak solutions of eserine with boric acid. Strong solutions of eserine are liable to cause iritis.

Cataract appears in so many different forms that much judgment is required: and the operation may be attended with as many if not more complications than any operation in surgery. We scarcely find two cases exactly alike; one may not require iridectomy, another does. In those cases where prolapse of the iris comes on some hours after operation eserine is not of much value and cannot replace iridectomy. My experience has been such that I am forced to think that many of the cases reported without iridectomy required an iridectomy subsequently to the extraction—within twenty-four to forty-eight hours.

The method of opening the capsule is one requiring the most serious thought in the operation, and the removal of a large piece from the centre is advisable. Laceration of an opaque capsule after extraction is a serious and dangerous procedure, and it is better to extract than to tear through on account of stirring up the vitreous with the knife or needle.

DR. JACKSON: I used the term "simple extraction," because it is a term commonly employed to designate the operation in question, and not to give the idea that cataract extraction was at all a minor or trifling operation. I think though that the term is strictly applicable, for the operation is distinctly simplified in certain directions. And in that it is more simple it conforms with the general tendency of surgical advance at the present time, which is toward the omission of various proceedures that were formerly believed necessary, and the concentration of our attention on what is really essential, that it may be done in the best possible manner.

EXAMINATION OF THE BLADDER WITH THE ELECTRIC-LIGHT CYSTOSCOPE.

By JOHN B. DEAVER, M.D.,

[Read November 11, 1891.]

My remarks on cystoscopy will embrace first, exhibition and description of the instrument I use and believe to be best, namely "The Leiter Incandescent-light Cystoscope."

Second, the battery I regard the simplest, the least expensive, and which fulfils every purpose. In my office I use a stationary storage battery.

Third. How to use the instrument, and the most favorable position in which to have the patient.

Fourth. Normal appearance of the healthy bladder.

Fifth. The pathological conditions where such an examination is of special value.

The Leiter incandescent-lamp cystoscope consists of three portions, the beak, the shaft, and the ocular end. The beak is a hollow hood fastened to the body or shaft by a screw and has on its upper surface an oval aperture covered in by a rock-crystal plate. The hood, when in position, protects the lamp.

The shaft or body is 7½ inches in length and 22 millimeters in circumference; a tube rests within the body or shaft containing a system of lenses which extends from the window of the prism to the ocular end, and can be lengthened like the tube of a microscope, increasing the size of the image presented to the prism.

The elbow is furnished with a prism to reflect entering rays of light directed along the central tube to the observer's eye.

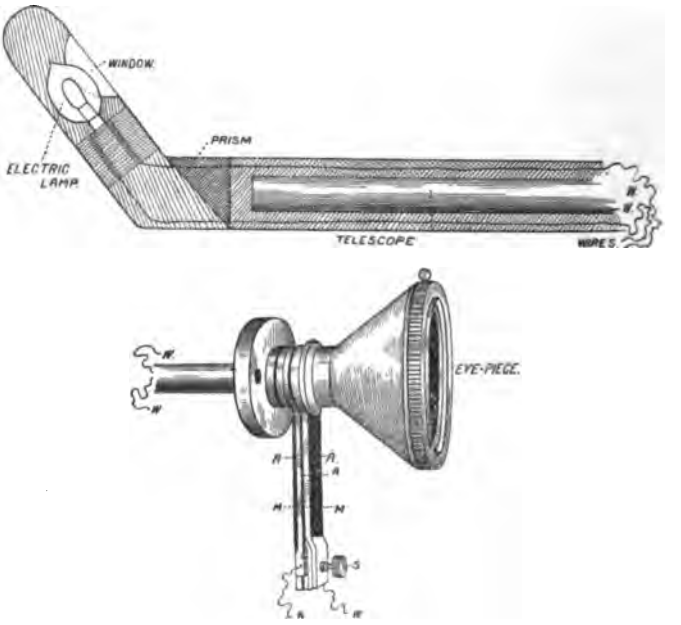
These instruments have the window and lamp on the concavity. There is another form where the window and the lamp are placed on the convexity; still this instrument answers all practical purposes as it can be rotated.

To the distal end of the shaft a small incandescent lamp is attached by means of the terminals which fit into two sockets; these are in direct communication with the battery by means of insulated surfaces.

The manner by which the lamp is placed in position makes it easy to remove when the carbon is burned out. The hood is unscrewed, the lamp lifted out of the sockets by a pair of forceps or the fingers, the new lamp fitted in position in the same manner, and the hood replaced.

At the junction of the shaft and ocular portions there is a holder containing the two binding posts to connect the cords with the battery,

FIG. 1.



a, Rubber insulators; *m*, metal plates; *w*, connecting wires; *s*, screw closing circuit.

also a small knob upon the ocular end to show the position held by the cystoscope in the bladder.

The improved cystocope is essentially the same as the original with the exception of the holder. This contains the binding posts to connect it with the battery and the cut-off key, which is manipulated by means of a screw instead of a kick-over, which is used in the original instrument. The holder allows rotation of the instrument without changing the position of the hand. It also permits the current from travelling behind it by meaus of an ebonite or rubber insulation.

This is not present in the original instrument, therefore disagreeable electric shocks are sometimes received by the observer.

The objections to the use of the cystoscope are: first, the danger of burning the mucous membrane, as the lamp becomes hot quickly if it is allowed to burn in air instead of immersed in water; it becomes warm in four seconds, unbearable in ten seconds, and scorching the skin often in fifteen seconds. This can be avoided, however, by immersing the beak in water, when it can be touched with impunity, the heat being rapidly absorbed. This occurs in the bladder, the heat being carried off by the medium contained therein, either urine or water.

It is the rule in electric cystoscopy that the bladder must contain from four to six ounces of urine or water, the greater the distention of the bladder the more satisfactory will be the examination, the comfort of the patient being considered. Even though the bladder contain a sufficient quantity of the fluid medium and the beak of the instrument is brought in contact with the bladder-wall for any length of time, scorching of the mucous membrane will take place.

The second objection that may be raised against the use of the instrument is the danger of the lamp breaking upon contact of the heated hood with the medium. Should this accident occur the bladder would not be exposed as the lamp would still be enclosed in the metal hood, the opening of which is covered by an unbreakable plate of rock crystal.

In cases where the prostate gland is irregularly enlarged it may be difficult if not impossible to make a satisfactory cystoscopic examination, as the instrument cannot be made to engage properly in the bladder. Where the urethra is the seat of stricture, the calibre of which is less than twenty-two millimetres, it goes without saying, that the cystoscope cannot be introduced until the calibre of the urethra at this point is raised to that of the size of the instrument; where the meatus is contracted it will call for enlargement.

Where the urine contains pus or blood, the walls of the bladder cannot be clearly made out. This can generally be overcome, however, by washing out the bladder thoroughly and injecting boric-acid solution.

Where the bladder is contracted it is difficult to manipulate the cystoscope satisfactorily. Some cases of irritable bladder will not tolerate a sufficient amount of urine or water to permit of an examination. Here an injection of cocaine can be used to overcome the difficulty. The other conditions for the successful manipulation of the cystoscope are:

Before arranging the patient for the examination, it should be the rule to see that the lamp and the battery are in working order. Connect the cystoscope with the battery, turn on the current with the rheostat at 0. Now gradually increase or diminish the resistance by means of the rheostat until the lamp burns with a bright white light. The lamp not working satisfactorily it will be necessary to change it before the examination can take place.

As the carbon filaments in the lamp vary, it will be necessary to guage the resistance offered by the carbon by means of the rheostat. In those lamps where the resistance offered by the carbon is slight the lamp will burn only when the rheostat is at the maximum, and in those where the carbon offers greater resistance the lamp will only burn when the rheostat stands at the minimum.

The Grenet or plunge battery, which I prefer to use outside of my office, is made by Mr. Flemming, of Philadelphia, and consists of a box containing two equal compartments; the first of which is occupied by a series of rubber cells, one-half filled with the following solution: Potassium bichromate, 6 ounces; sulphuric acid, 5 fluidounces; water, 3 pints. This solution must be renewed every two or four weeks, according to usage. The second compartment contains one large cell, the object of which is to catch the drip from the plates after their removal from the bichromate bath, and also to protect them.

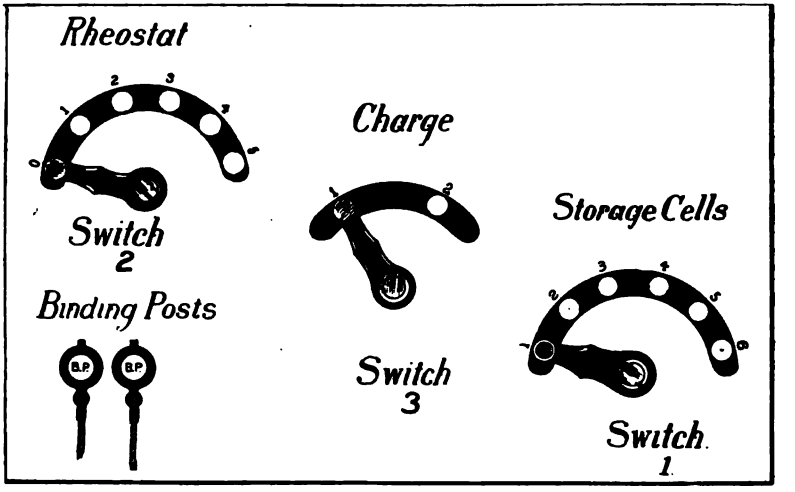
The two compartments are covered by a bed, the under surface of which is divided into two equal parts, one-half being covered by a sheet of rubber, to close the cells when not in use, and the other half occupied by a number of sets of plates. Each set is composed of two carbon and one zinc plate, which are fastened to the bed in the usual manner, and so connected as to have independent action, the number of cells being thrown into circuit as required. After using the battery and wishing to discontinue the current it is merely necessary to lift out the plates, change sides, and deposit them in the one large compartment.

Upon the upper surface of the bed are a number of binding posts corresponding to the number of cells employed, and by attaching the cords in a proper manner the number of cells desired can be brought into circuit. On this surface there is also a rheostat consisting of a rubber plate wrapped with silver wire, connected with the cells and having a swinging arm which can be moved to any part of the plate; the object of the rheostat I will speak of later.

For office use a storage battery is probably the best, as it has in its favor cleanliness, all the cells being placed in the cellar, and these

requiring but little attention. The cost is the only objection which which can be raised against it. The battery plant I use in my office consists of five Gibson storage cells connected with the switch-board, so that the cells may be added one at a time; also sixteen gravity cells, which are connected with the switch-board and are connected through a separate switch.

Fig. 2.



The switch-board was designed by Dr. Brinkmann, a diagram of which will be seen on the blackboard.

When using the storage battery for cystoscopic work the switch No. 1 is carried to point 3, which represents six volts; switch No. 2—the rheostat—is then carried over until the lamp burns with a white light.

During the time that this battery is not in use the storage cells should be charging. This is accomplished by moving switch No. 3 to point 2, thus bringing the terminals of the constant cells in contact with those of the storage cells.

Two binding-posts are placed at the lower corner for the cords to transmit the current to the cystoscope.

The rheostat consists of a number of independent coils of wire, so that as the current is made to pass through them it increases the resistance.

The examination may be performed with or without a local or general anæsthetic. I think the latter is preferable, for reasons stated further on. The best position for examination is that used in lateral or median perineal lithotomy. If the bladder has been recently examined, or if pus or blood be present in the urine, it must be

withdrawn, and the bladder washed out thoroughly through an ordinary catheter with a boric-acid solution until the fluid runs clear. The bladder being now thoroughly clean, from four to six ounces of boric-acid solution are thrown in, and, if necessary, a drachm or more of a four per cent. solution of cocaine also injected into the bladder. The catheter is then withdrawn and the cystoscope introduced, previously smeared with a few drops of glycerin. Care should be taken not to turn the switch until the beak has fully entered the bladder, to avoid scorching the prostatic urethra.

The following rules should be observed in cystoscopy:

Why I prefer to conduct the examination without an anæsthetic is, that there is less danger of burning the mucous membrane of either the bladder or prostatic urethra, when we have the sensations of the patient to guide us. There are cases, however, where a successful examination depends upon having the patient anæsthetized.

When the examination is completed, before withdrawing the instrument the current is to be shut off and the hood allowed to cool before removal.

In conducting the examination the part of the bladder first examined should be the base, more pathological conditions being met with here than elsewhere. The examination of the interior of the bladder is never complete until the ureteral orifices have been seen.

The mucous membrane of a healthy bladder presents a reddish-yellow or light-straw color with a glistening surface. A few vessels will also be seen.

The object of having the bladder well distended is to be able to see the orifices of the ureters, otherwise they may be concealed by folds of the mucous membrane.

With the orifices of the ureters in the field of vision, the escape of the urine which takes place in the jets can be readily seen. The escape of blood or pus from the ureter can also be seen.

I would not advise the use of the instrument in all bladder cases by any means; on the contrary, I regard it as playful to examine cases where the diagnosis can certainly be made by other means.

I believe the greatest field for the examination of the bladder with the electric-light cystoscope is, in obscure cases of hæmaturia, where, without this instrument, it is absolutely impossible to differentiate between renal and vesical hæmaturia by an examination of the urine of the bladder with the searcher and by the finger in the rectum, coupled with any additional light that may be thrown upon the case by a familiarity with its history.

I will relate the history of a case in point:

W. R. was admitted to the medical wards of the German Hospital suffering from hæmaturia. It was thought that his trouble was a surgical affection, and he was therefore referred to me for a cystoscopic examination.

The patient complained of pain referred to the right loin, which at times radiated down to the line of the ureter. He had lost flesh progressively for the past two months. The urine had contained blood for some little time. Examination of the loin revealed nothing abnormal. The bladder was washed out and injected with six ounces of boric-acid solution; this quantity exciting tenesmus, he was allowed to empty the bladder, when but four ounces of the same solution was thrown in and retained comfortably.

The instrument, lubricated with a few drops of glycerin, was gently passed into the bladder.

The medium was thoroughly clear, and there was no difficulty to map out the relations.

On observing the ureters, it was observed that a gush of blood made its exit from the right side, to which all the pain had been referred. The diagnosis of sarcoma of the kidney was made.

He presented himself some three or four months later, when there was a large mass which could be both seen and felt in the region of the kidney. The patient died several days later, and a post-mortem examination revealed a large sarcoma of the kidney.

To distinguish between the different forms of vesical hæmaturia cystoscopic examination is required in only a few instances. The most common cause for vesical hæmaturia is one or other form of malignant growth; here the diagnosis can usually be made by the means already well known to us. There is a variety of hæmaturia always associated with cystitis, which, if it does not yield readily to treatment, suggests something more serious. I will direct special attention to this form, as well as to the value of a cystoscopic examination in the diagnosis of it. Some authorities describe it under the name of hemorrhagic cystitis. One of its causes is the complete evacuation, by means of a catheter, of a greatly distended bladder the seat of cystitis. Under these circumstances, the pressure being removed from the bloodvessel walls suddenly, hemorrhage is a consequence. It may also result from the presence of a foreign body which has excited ulceration, from an enlarged prostate, etc.

We meet with cases of vesical hæmaturia when a cystoscopic examination shows nothing more than a cystitis, yet it will not yield to treatment. This is, to say the least, suggestive. I recall one such case, the history of which I will relate:

The patient, a man, forty-two years of age, had suffered from cystitis for some months previously to coming under my care. The urine was never free

from blood, and at times contained a considerable amount. Examination showed nothing other than a subacute inflammation of the mucous membrane. Treatment, which was prolonged, was of no avail. Finally I advised, and subsequently performed, a median perineal cystotomy, to determine first if there was any obscure pathological condition sufficiently far advanced to account for the trouble; and, secondly, with the hope that a cure might be thus brought about. The only additional light thrown on the case by the operation was the presence of questionable nodular points here and there. This patient has gone from bad to worse, until I now believe the trouble to be carcinoma.

FOREIGN BODIES IN THE BLADDER.—A cystoscopic examination should be made in those cases of foreign bodies introduced from without into the bladder where the history is unreliable, granting of course a diagnosis cannot be made by other means. Again we meet with cases where the patient, who is the subject of a catheter life, believes, yet is not positive, that a piece of the instrument is in his bladder from some mishap occurring either in its passage or upon its withdrawal. Ordinarily I admit that such an examination is not only not necessary but meddlesome interference. Here the question arises, How are we to obtain our experience to make us cystoscopists? In such cases when the examination is not called for to make the diagnosis, and where we operate for its removal, in the event it cannot be extricated through the natural outlet, after the patient has been etherized, look into the bladder and locate the body. Observing the precautions mentioned in the early part of my remarks, trouble cannot arise, nor do we complicate the operative procedure by such an examination.

In foreign bodies formed as a result of a pathological process, including growths, stones, etc., the instrument has a limited field, but its use here will be discussed under their respective heads.

STONE IN THE BLADDER.—There are a few cases of vesical calculi where a cystoscopic examination is required to reveal their presence, yet it has a limited field here. One class of cases is where we have examined the bladder for stone and believe we have found one and at a second examination fail. It is the practice of surgeons, having found a stone in the bladder at a previous examination, and now being prepared to operate, when under ether to explore again, and if the stone cannot be found not to operate. In such cases the cystoscope should be used. Another class is where litholapaxy has been done and in the course of a few days the symptoms make both patient and surgeon doubtful as to whether there has been a fragment left which the sound has not been able to detect.

Encysted stone, particularly if small and cannot be detected by other means, the cystoscope will aid us in clearing up the diagnosis.

I will relate the history of a case of stone in the bladder occurring in a patient of my friend, Dr. James Anders, of this city, where a careful cystoscopic examination after either of the first two operations, three in all having been performed for recurring stones, would have revealed that which subsequently proved to be the nucleus of each of these stones. The patient, a female, had sometime previous to the first operation for stone an ovarian tumor removed. The ligature, or at any rate one of the ligatures employed in treating the ovarian pedicle, had ulcerated through the bladder-wall to the mucous coat, where it not only became imbedded, but projected as well, thus exciting acute cystitis which resulted in the deposition of calcareous material to the extent of producing a considerable sized stone. The operation performed each time was that of litholapaxy. At the end of the second operation digital exploration of the bladder showed a projection from the right lateral aspect of the posterior wall, when gentle attempts to remove it failed.

At the end of the third operation, feeling it imperative to get rid of this foreign body if still present to insure the patient against the formation of another stone, the bladder was again explored digitally, and a foreign body detected and removed after considerable difficulty: it proved to be a ligature. Since the last operation, now over three years, the patient has remained well. The interval between the formation of the stones was but six months, therefore, it is fair to infer that the trouble will not recur.

Ulceration.—In cases of vesical hæmaturia where the cystoscope shows the presence of one or more ulcers not associated with a growth or foreign body, the testicles, spermatic cords, and prostate being free from nodular masses, the most probable cause for such is either tuberculosis or scrofula. The history of the case, a careful examination of the chest, the appearance of the patient, the presence of glandular enlargement, etc., may assist materially in forming an opinion.

Growths.—In growths of the bladder the instrument is of inestimable value. No longer will we, as was formerly the practice, advise a cutting operation where we are in doubt as to the presence of such, but will settle this definitely by making a cystoscopic examination. Here too, I grant, we meet with cases of malignant growth where it is not necessary to make such an examination, the diagnosis being readily made without it. In papilloma, which by no means has hæmaturia associated with it in all instances, the instrument serves

first to determine the nature of the growth, if it is not already known, and second its situation and extent of attachment, thus guiding the surgeon in the selection of the operation to be done for its removal.

With the bladder as with other organs it should not be cut into for obscure trouble for the purpose of making a diagnosis until all other justifiable measures have been exhausted with negative results.

DISCUSSION.

DR. H. A. SLOCUM: I have had some experience with cystoscopy and endoscopy in women. I am sorry that Dr. Deaver did not say more in regard to the appearance of the mucous membrane. I have often been surprised to find signs of inflammation where there had been no complaint. The first thing that strikes an observer is the similarity between the appearance of the bladder and the appearance of the retina. The upper part of the bladder is of a light pink color and contains few bloodvessels. When the position of the ureters is examined large vessels are seen similar to what are found in the retina. The appearance of the ureteral orifices vary very much. They are sometimes like a slit, and sometimes it is difficult to determine where they are. Generally they are mounted on the top of a little cone either acute or gradually swelling.

There is always difficulty in examining the internal orifice of the urethra, unless the instrument is much tilted upward or downward. In using the urethroscope I push it in until the bladder is reached, when the urine escapes and the posterior wall of the bladder comes in contact with the instrument. It is then gradually withdrawn, tilting it from side to side so as to examine the folds of the urethra.

DR. DEAVER: What has been said about the appearances of the ureters is quite true. They are often found under a fold of mucous membrane. This is often due to the fact that the bladder is not properly distended. It also depends upon the grade of inflammation present.

The attempts to examine the internal orifice of the urethra in the male subject has not been satisfactory on account of the presence of the prostate gland.

I believe that the cystoscope has a comparatively limited field, but it will accomplish a great deal that cannot be accomplished in any other way. So high an authority as Sir Henry Thompson has advocated exploratory incision in doubtful cases. If the condition can be determined by the use of this instrument, it will be unnecessary to operate in order to make the diagnosis.

THE MEDICAL TREATMENT OF CYSTITIS.

By JAMES TYSON, M.D.

[Read November 11, 1891.]

The medical treatment of cystitis does not furnish a very satisfactory chapter in therapeutics. It includes such treatment as the physician is called upon to use supposing the exciting cause, such as a stone or obstruction in the urethra, to have been removed, wherever possible. I say when possible, because the enlarged prostate which is responsible for so many cases of cystitis is, in the vast majority of cases, not removable even in these days of brilliant surgical results. It must also include the treatment of a certain number of cases in which no removable cause is ascertainable, as well as cases where, as with a long previous gonorrhœa, the cause has long since been removed, but has left a deep-rooted tendency scarcely eradicable.

It should be stated, too, at the outset, that the vast majority of cases of so-called cystitis are inflammations of the neck of the bladder and of that part of the urethra passing through the prostate.

Acute cystitis is far less commonly met by the physician than the chronic form, while its treatment is far simpler, and, I may add, more satisfactory, at least so far as the removal of the acute symptoms is concerned. Rest in bed is a primary and essential condition. Leeches to the perineum should be applied more frequently than they are. A poultice to this same region and over the abdominal region is always useful, while a brisk saline cathartic should never be omitted.

As the feverish state which always accompanies cystitis is more or less constantly associated with a scanty urine, concentrated and irritating to the inflamed mucous membrane, it is desirable at once to increase the secretion, and thus dilute it. Copious libations of pure water, to which the citrate or acetate of potassium is added, in fifteen to twenty grain doses for an adult, should be allowed. The ordinary spirits of nitric ether in two drachm doses every two hours is an admirable adjuvant, and may be combined with the officinal liquor

potassii citratis, which contains about twenty grains of citrate of potassium to the half ounce. Formerly the mucilage of flaxseed or flaxseed tea was much used as a diluent menstruum for the diuretic alkalies indicated, but I am doubtful whether it is any more efficient than a like quantity of water.

Where there is much pain and straining, as is often the case, especially where cantharides is the cause of the inflammation, opium is indispensable, always in the shape of a suppository, half a grain to a grain of the extract being thus administered, or a proportionate amount of morphine. Iced-water injections into the rectum, or pieces of ice similarly applied, are very efficient in allaying the pain and irritation where additional measures are needed.

The successful treatment of *chronic cystitis* is a much more difficult task, for three evident reasons: 1st, the constant presence in the bladder of the urine with its irritating qualities, especially to an inflamed mucous membrane; 2d, the difficulty in getting remedies to reach the inflamed surface; and, 3d, the pent-up inflammatory products, which in their decomposition often make the urine still more irritating by exciting in it ammoniacal changes. There is no doubt that, if the urine could be kept from entering the bladder during the existence of an inflammation, the latter would rapidly heal; that cure would be facilitated by obtaining ready escape for the pus and mucus formed in the inflammatory process; while happier results might also be reasonably expected if we could secure readier access for remedies to the inflamed areas. None of these indications can be met entirely, hence the difficulty in attaining a cure. They remain, however, the conditions to be fulfilled, and while none can be thoroughly secured, they may be approximated in various degrees. To do this should be the object of treatment.

First, the irritating qualities of the urine may be diminished by the use of diluents as already recommended in the treatment of acute cystitis. Almost any of the negative mineral waters, so highly recommended by their owners, are useful for this purpose. Just as good is pure spring water, or even Schuylkill water, and better is distilled water. From one to two quarts should be taken daily. If the kidneys are equal to their office, a large quantity of light-hued urine, of low specific gravity and relatively weak in solids, will be secreted.

When it is proposed to go further and add to the efficiency of diluents, mistakes are often made. While one can scarcely go astray in adding alkalies to the fluid ingested in acute cystitis, it is very different with the chronic form. In this the urine is often alkaline, or ready

to become so on the slightest addition of alkali to the blood. Such alkalinity of urine in turn favors decomposition, the effect of which is to convert the pus, if present, into a tenacious, glairy fluid which the bladder cannot evacuate. Notwithstanding this tendency, I have known liquor potassæ and other alkalies to be administered under precisely these conditions—adding fuel to the flame. The indication under these circumstances is to render the urine acid, if possible, although this is very difficult to accomplish. Benzoic acid has the reputation of doing this, and it probably is true of it when administered in very large doses. It may be given in the shape of a five-grain compressed pill, of which at least six must be given in a day to produce any effect. The same property has been assigned to citric acid, but this is a mistake, as all of the vegetable acids, when ingested, are eliminated as alkaline carbonates.

The second indication is to medicate the inflamed surface. Two ways, of course, suggest themselves: (*a*) by the internal administration of drugs; (*b*) by the injection of medicated liquids into the bladder.

To carry out the first method, an enormous number of infusions, decoctions, and fluid extracts of vegetable substances have been suggested, the vast majority of which are absolutely useless, except as they serve by their quantity to act as diluents. Among the best known of these are buchu, pareira brava, uva ursi, and triticum repens. I have never known any beneficial results from any of them, and have long ago ceased to prescribe them.

The only class of remedies I have found of service in cystitis through their internal administration are the balsams. Of these, the balsam copaiba is practically unavailable, because not one stomach in a hundred will submit to its ingestion in sufficient doses or for long enough time to permit it to be of any use. On the other hand, I have found sandal-wood oil very useful, and it is about the only remedy of which I can say this for its direct effect upon the mucous membrane of the bladder. It is also comparatively well borne by the stomach, and is best administered in capsules containing ten minims. I believe it has heretofore been the usual custom to give these and like remedies after meals, but I have recently adopted the method of giving them on an empty stomach before meals. I believe they are as well, and even better, borne than when given after food, and they pass into the blood much more quickly. It is desirable to impregnate the blood and impart to the urine a balsam odor. This is scarcely possible with less than eight capsules a day—two before each meal and two at

bedtime. I think I may say that I have found the so-called Santal-Medy capsules, which are, I believe, nothing but a very pure sandal-wood oil, better borne than the other specimens of the oil. I have given as many as twelve of these a day for considerable periods of time without deranging the stomach.

Both boric acid and benzoic acid are useful adjuvants to the treatment of chronic cystitis through their antiseptic effect on the urine, each in 5 grain doses rapidly increased to 10. I have used resorcin in 5 to 10 grain doses, and naphthalin in 2 grain doses for the same purpose.

The application of remedies to the bladder by injections can be conveniently considered in connection with the third indication—the getting rid of the products of inflammation, the pus and mucus, and the compounds resulting from their decomposition. The latter are, of course, not always present, but all who have had much experience with cystitis are familiar with the tenacious, glairy mucoid matter, which will not drop or rise up in a pipette, glistening with large crystals of triple phosphate, and exhaling a stinking ammoniacal odor which quickly contaminates an entire apartment. There is only one way to get rid of this, and that is to wash out the bladder, and too often this is too long deferred. Tepid water should be first used, and the injection made through the soft catheter now so invariably adopted. Sir Henry Thompson is very emphatic in his directions that no more than two ounces should be thrown in at a time, and that this should be allowed to run out, a like quantity again injected and allowed to run out, and this repeated until the water comes out as clear as it enters. In a very large experience in washing out bladders, I have never met an instance in which the amount named by Sir Henry may not be doubled with advantage, so that I begin with four ounces. When this quantity is used, a much shorter time is necessary to cleanse the bladder thoroughly; and after the capacity of the bladder has been determined I often throw in more, because it is sometimes useful to distend the viscus a little, for in this manner the depressions and inequalities between the muscular trabeculæ, always present in advanced bladder inflammations, are thoroughly reached. These simple injections, practised once a day, or in severe cases twice a day, often result most happily. I have seen the pus reduced from large bulk to a mere trace, and micturition reduced from five or six times to once a night. Commonly, after a few injections with plain water, I add some medication. My favorite is the salicylate of sodium in the proportion of a drachm to the pint. Its disinfecting qualities

are undoubted, and I have some reason to believe that the soothing effect claimed for it is not without foundation. I have used a good deal of Sir Henry Thompson's soothing solution—of biborate of sodium an ounce, glycerin two ounces, water two ounces, and of this mixture half an ounce to four ounces of tepid water—with about the same result. Boric acid, in the proportion of a drachm to the pint, is also very satisfactory.

Alum is an astringent which has been too much overlooked of late in suppurating processes in mucous membranes, and may be substituted for the salicylate with advantage where the pus does not diminish as rapidly as is desired. It should be more cautiously used than the salicylate of sodium. Sufficient of the powdered alum should be first added to a pint to give it a distinctly astringent taste, when the bladder should be washed out as described, while a small quantity may be allowed to remain after the last injection.

Where there is a foul odor present I use the bichloride of mercury in solution, but exceedingly dilute. It is almost incredible how small a proportion of this salt is irritating to the bladder, and having learned by experience, I never begin with a solution stronger than 1 : 25,000, but gradually increase the strength if it is well borne. Carbolic acid may be substituted for the bichloride of mercury, but it has not been so satisfactory in my hands.

Other drugs are recommended to be similarly used, but I have had little or no experience with them. One from which much may, with reason, be expected is the peroxide of hydrogen, one part to five of water. In the single instance in which I have used this, the patient, who had previously been using the bichloride solution, returned of his own accord to the latter, because he thought it more satisfactory. Among other remedies recommended to be used the same way are acetate of lead, one grain to four ounces; dilute nitric acid, one or two minims to the ounce; and nitrate of silver, one grain to four ounces; but I have had no experience with them.

Anodynes are indispensable in many cases of cystitis to relieve the patient of extreme pain and the frequent desire to pass water, which are the result of the same cause. Opium and its alkaloids are the most efficient, and they are best introduced by the rectum. There appears to be no absorbing power for opium at least, and there is no use in attempting to use any iodynes by that channel.

Cocaine, from which so much might reasonably be expected, has failed of its purpose in my hands. I have injected as much as two ounces of a two per cent. solution into the bladder without effect, except

to produce some of the symptoms of cocaine poisoning. Most disappointing, too, has been the use of cocaine to remove the exquisite tenderness of the urethra which sometimes attends this condition, and is a serious drawback to the use of the catheter.

Where there is greatly enlarged prostate, catheterization is indispensable, and is attended often with the most happy results. It is often too long deferred because of the natural repugnance to the use of the instrument. Of course, the patient or his friends should be taught to use the catheter and to wash out the bladder. In these days of refined antisepticism it is scarcely necessary to say that the extremest precautions should be taken to cleanse the catheter after its use, in order to avoid sepsis. There is nothing better for this purpose than the bichloride solutions 1 : 1000, in which the catheter should be allowed to lie for a short time after being cleansed with boiling hot water.

How much can be accomplished by such treatment as the above-described? That an absolute and total cure is ever obtained in chronic cystitis is exceedingly doubtful. Hence the statement at the beginning of my paper, that the medical treatment of cystitis does not furnish a very satisfactory chapter in therapeutics. On the other hand, that a life of suffering may be converted into one of comparative comfort is certainly true, and I have many times seen it. Nay, more; I have more than once seen a life prolonged half a dozen years in such comfort by careful attention to the bladder of the kind described.

It occasionally happens, of course, that all treatment of this kind fails, and yet the patient lives to be tortured by the discomfort of the situation. Three times I have had perineal section done by the surgeons for the relief of such cases, in each case with some relief, although with less than was hoped for.

DISCUSSION.

DR. H. A. SLOCUM: I am sorry that Dr. Tyson did not say something about diet—about such articles as tomatoes and asparagus, particularly the latter.

In the local treatment of cystitis I have obtained good results from the use of boric acid, two drachms to a pint of water used warm. This is introduced with a catheter with a little funnel. I have recently seen described a method of washing out the bladder by means of a catheter introduced into

the urethra. To this is attached a tube, and the fluid is allowed to enter by hydrostatic pressure.

I have also used boric acid internally. This in ten grain doses every two hours has been of more service than anything else that I have tried.

DR. T. S. K. MORTON: In the treatment of chronic cystitis I have found most satisfaction from the use of salol in conjunction with milk diet. I have the greatest confidence in the administration of salol in doses of from three to five grains repeated several times daily. The theory is, that in the kidneys salol liberates carbolic acid. While many cases have been benefited by the use of the drug, in other instances it has, like everything else, failed.

I feel convinced, also, that I have had good results from the internal administration of cocaine, owing to its diuretic action. I think that it has some local effect upon the bladder.

A third drug from which I have had good results is sandal-wood oil, and the preparation mentioned by Dr. Tyson (Midy) is the best; but it is objectionable on account of the fact that it is largely advertised, and the name of the manufacturer is stamped on the capsules, thus giving to a certain class of patients a clew to their treatment which is an advantage neither to them nor us.

DR. GEORGE E. SHOEMAKER: I wish to add a word in favor of the internal administration of boric acid. I have in the past four years used it in a large number of cases with a great deal of satisfaction, giving it in doses of from five to eight grains every two hours in plain water or cinnamon water. Of course, all internal treatment is subsidiary, but this is the drug which has given me most satisfaction.

DR. CHARLES P. NOBLE: I have heard no mention of benzoate of ammonia or benzoic acid. I have found these drugs of great advantage in foul alkaline urine. Under some circumstances I have had good results from boric acid. Rest, a restricted diet, and leaving off meats, have had a good influence. Locally I have used a saturated solution of boric acid, and rarely have had to reduce the strength of this. I wash out the bladder every second or third day. I have seen good results from triticum repens, particularly in cases where *ardor urinæ* was very marked. Better results can be had by combining it with tinctures of aconite and belladonna, and with bromide of sodium. In summer-time a pleasant remedy is watermelon used freely. This, as is well known, is a powerful diuretic. It gives a bland, unirritating urine, and in a measure avoids the necessity for irrigation.

My experience in the treatment of cystitis has been largely with women. A growing experience makes me the more convinced that cystitis has some local cause, as a rule, which must be sought for and removed. In women a torn perineum, resulting in cystocele, and tubo-ovarian inflammation are the most common causes of cystitis. When these conditions receive appropriate treatment the cystitis disappears.

DR. JOSEPH HOFFMAN: There is a combination of three drugs which I have used with benefit—these are benzoate of ammonium, salicylate of sodium, and bromide of potassium. The last is a local sedative. I think that benzoate of ammonia is perhaps the most efficient of all remedies in chronic, and even in acute, cystitis. The salicylate of sodium is also of value. The mechanical treatment should not be forgotten. It is absolutely impossible

to cure acute cystitis with the patient going about. Rest is an important factor in the treatment. It is only by rest in bed that we can secure absence of abdominal tension, which is important.

DR. JOHN F. DONNELLY: In one or two instances in which I have used iodoform in the proportion of two grains to the ounce in four drachms of mucilage, it acted very efficiently and prevented ammoniacal decomposition.

DR. DANIEL LONGAKER: I have found benzoate of ammonium most effective, but prefer to give it with belladonna rather than with bromide of potassium. Ten grains of the salt, four times a day, are sufficient.

DR. MARY E. ALLEN: In one case where I tried a number of remedies without effect, benefit followed the use of fluid extract of buchu with fluid extract of galium aparine. These were used in conjunction with suppositories of opium and belladonna, Buffalo lithia water, and a diet consisting principally of milk and vegetables.

DR. TYSON: I have had no experience with asparagus as a therapeutic measure in cystitis. Boric acid and benzoic acid I quite forgot to mention in the paper, which was prepared hurriedly. I have used them both freely. Benzoic acid has the disadvantage of affecting the stomach unpleasantly. I have not used benzoate of ammonium, but shall take the first opportunity to give it a trial. I cannot say that I have seen any curative results from boric acid or benzoic acid. They affect the urine favorably. I have also used salol, but have found it very uncertain. In one case where the disagreeable odor of the urine was complained of, I gave salol in large doses without any effect.

THE URETHRA, BLADDER, AND URETERS DURING PREGNANCY, LABOR, AND THE PUERPERIUM.

By W. H. PARISH, M.D.,
PROFESSOR OF OBSTETRICS, DARTMOUTH MEDICAL COLLEGE; PROFESSOR OF ANATOMY, WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA, ETC.

[Read November 11, 1891.]

THE condition of increased vascularity and irritability of the urethra, bladder, and ureters during pregnancy is due in part to the pressure of the uterus, and in part to the alterations in the general pelvic circulatory and nervous conditions awakened by the stimulus incident to gestation.

The bladder in early pregnancy is less capable of distention in the antero-posterior direction, and its enlargement is chiefly lateral. Later in pregnancy the enlarging uterus draws the bladder upward above the pelvic brim. The changes in the position of the bladder during pregnancy doubtless determine to some extent, more frequent, and at times annoying micturition, yet the elevation of the bladder above the brim is a conservative provision, for in this way the bladder is largely protected from harmful pressure during normal labor.

However, the utero-vesical ligaments are so unyielding that the bladder participates in such abnormal displacements of the uterus as occur during the pregnant state; as, for instance, it follows the uterus in procidentia, and is drawn downward and backward in retroversion of the gravid womb. The urethra becomes elongated with the elevation of the uterus, and in early pregnancy if uterine prolapse occurs, and also in advanced pregnancy if the uterus drops into the true pelvis, the upper portion of the urethra curves backward and downward, constituting dislocation of the upper third of the urethra, with the symptoms pertaining thereto.

With the changes in the position of the bladder, the lower portions of the ureters necessarily change in position, but these tubes suffer chiefly from pressure of the pregnant uterus, and, as a consequence, they, above the point of pressure, often become dilated to the size of

the finger or of the thumb. The blocking up of the urine in the ureters influences the renal condition unfavorably, and doubtless, at times, contributes in the production of uræmia and eclampsia. The pressure exerted upon the ureters suggests the advisability of repeated recumbency, or, better still, of the knee-chest position, during advanced pregnancy. When peri-uterine adhesions, with uterine displacement, exist, there is still greater risk of injurious compression of the ureters, and of eclampsia.

Mild cystic catarrh, some say inflammation, is of somewhat frequent occurrence during pregnancy, and may be the cause of albuminuria when the amount of albumin in the urine is small.

Hæmaturia occasionally occurs, because of the impeded pelvic circulation. A varicose condition of the bladder and urethral veins, usually with a like condition of the anterior vaginal wall and of the vulva, may arise, and be the cause of hæmaturia, with frequent urination and pelvic distress. This morbid vascular condition calls for rest during pregnancy. After labor it usually disappears, but when subinvolution occurs, it may become persistent.

When cystitis, even of mild type, exists during pregnancy, its careful treatment is strongly indicated, for labor and the lying-in are very prone to aggravate the inflammation. Especially is this true if the cystitis is of gonorrhœal origin. It has been observed, also, that when cystitis exists during pregnancy, subinvolution of the uterus is very apt to occur, and the inflammation is very liable to become chronic.

In retroversion and incarceration of the gravid uterus, the lesions produced in the urinary apparatus constitute the most serious morbid changes incident to this grave complication of early pregnancy. Ischuria is the earliest, and one of the most important symptoms. The early compression of the urethra by the uterine cervix produces œdematous swelling of the urethral wall, with at first partial obstruction to the exit of urine. The pressure instituted by the enlarging uterus increases until urinary retention occurs, accompanied, it may be, with dribbling of urine from the over-distended bladder. The retained urine rapidly undergoes ammoniacal decomposition, and cystitis becomes an early complication. The inflammatory action produces diphtheritic flakes over the mucous membrane of the bladder, with erosion and ulceration. Absorption of the decomposed urine occurs with constitutional symptoms.

The mucosa may be cast off from the entire bladder, but especially from the portions of the organ above the neck, showing that this

separation of the mucous membrane is due to the degree of congestion and of inflammation, rather than to direct pressure—for the pressure is greatest at the neck. I have seen large portions of the mucosa cast off and blocking the urethra. It is stated that the separation of the mucous membrane is not likely to occur before the sixth day of the incarceration.

In some instances portions of the musculosa have been thus separated, and gangrene of the entire thickness of the bladder-wall has occurred. Owing to the retention, the ureters become greatly and the renal pelvis moderately dilated. The inflammation extends along the ureters and invades the kidneys. The suppression of retention also occurs with constitutional manifestation.

In the over-distention the bladder-wall, though thinned at points, becomes remarkably thickened throughout most of its extent, and in a few days, even when entirely empty, will present to the palpating hand a firm mass, wonderfully like the non-pregnant uterus, and may mislead the examiner into supposing that the uterus is empty, and that a retro-uterine tumor exists.

In some instances the distended bladder has reached even to the ensiform cartilage. Rupture of the bladder has occurred, especially in the attempt at replacement. As an essential preliminary to replacement, the bladder must be emptied either with the catheter or by aspiration. When the over-distended bladder is being emptied, a bandage should be drawn firmly around the abdomen to lessen shock, to prevent the entrance of germs with atmospheric air, and to prevent hemorrhage from the cystic vessels.

Paralysis of the bladder accompanies the over-distention, and catheterization will be necessitated at intervals of six hours after replacement, otherwise distention will again occur, with danger of a reproduction of the uterine displacement. Irrigation of the bladder will be indicated for several days, for the cystitis and ascending ureteritis endanger life after the uterine displacement has been corrected.

In the original production of retroversion of the gravid uterus, an over-distended bladder probably has very little influence, except in instances in which retroversion preceded pregnancy, and in other instances in which superior adhesions prevented the distending bladder enlarging upward.

When we study the relations of the bladder to labor, we find that in an entirely normal delivery, the bladder does not usually impede labor, and labor does not interfere with the integrity, or injuriously, with the functions of the bladder. For, in addition to the elevated

position of the bladder at the end of pregnancy, the frequent micturition of labor is conservative, for thus the bladder is kept so nearly empty that its presence is in no manner harmful.

Should, however, œdematous swelling of the urethra, or the immediate effects of pressure, or perverted nerve-action lead to distention of the bladder, parturient expulsive efforts are rendered feeble and less efficient, and the presentation or position may be modified unfavorably.

In neglected cases, an over-distended bladder becomes a grave complication, partly in the same manner that it does in incarceration of the pregnant uterus. A distended bladder may contribute also to the formation of a fistula, or to rupture during expulsive or extractive efforts. In rupture, the tear usually occurs in the posterior wall and into the peritoneal cavity, though it may occur anteriorly, and, in the latter case, if low down may give rise to infiltration of the anterior abdominal wall. Collapse accompanies rupture of the bladder, and if urine escapes into the peritoneal cavity, a fatal result is very probable. Under such circumstances cœliotomy would be urgently demanded, with trimming and suturing of the lips of the rent, and careful toilet of the peritoneum.

Rupture of an over-distended bladder has occurred during expulsive efforts in an abortion at the third month of gestation, even when there was no incarceration of the uterus.

Cases of cystocolpocele, or prolapse of the bladder, usually with distention, have occurred during labor, impeding delivery and leading to the erroneous diagnosis of the bag of waters, or of a fluid pelvic tumor. Under such erroneous diagnosis the bladder has been incised or punctured *per vaginam*. A knowledge of the possibility of such a complication should lead to an easy diagnosis with the catheter carried into the bladder.

The downward dislocation of the upper portion of the urethra which sometimes occurs as the uterus enters the pelvis near the end of pregnancy may be further aggravated as the head descends, or when, with the forceps, a large head is pulled through the pelvic canal before moulding has occurred. This condition of the urethra is often associated with partial prolapse of the bladder, but both conditions usually disappear after labor if proper involution occurs, but may be persistent in subinvolution, and especially when ununited laceration of the perineum exists.

Undue distention of the bladder rarely occurs during labor, except in the second stage, and is then usually dependent upon pressure of the presenting part upon the urethra and the neck of the bladder.

When an anæsthetic is administered during either the first or the second stage of labor, retention may arise, and be due to the obtunding influence of the anæsthetic. It should also be remembered that the secretion of urine is increased during labor, and the bladder may become filled rapidly. Sometimes, when spontaneous urination seems impossible in the recumbent posture, an attempt to urinate while sitting and between the pains will relieve the retention and obviate the necessity of catheterization, unless the head is fixed in the pelvis. When catheterization is necessitated during labor the simple precaution of pushing up through the vagina, in the absence of pain, the presenting part is too often overlooked, with the result of always endangering the integrity of the urethral and bladder mucous membranes, and sometimes of failing to introduce the catheter.

In neglected cases it is occasionally necessary to resort to suprapubic aspiration of the bladder during labor, but before this is done one should call to his aid the relaxing influence of anæsthesia, and the favoring latero-abdominal and genu-pectoral positions.

Prolonged pressure, especially of the fœtal head, or occasionally of any part of the fœtus, endangers the integrity of the cystic, urethral, and uterine walls.

Ninety per cent. of urinary fistulæ are dependent upon injuries sustained during labor, and in most instances are produced by the prolonged pressure of some part of the fœtus. An evidence of the truth of the latter statement is the generally recognized fact that since the more prompt resort to the obstetric forceps has become the rule of practice, urinary fistulæ occur with greatly reduced frequency. The old practice of administering ergot during labor contributed, doubtless, to the production of fistulæ, through its influence in bringing about continuous uterine contractions.

It is long sustained pressure that determines the sloughing from which the fistula generally arises. Although the general use of the forceps has promoted in many instances the formation of fistulæ, yet I am confident that the injudicious use of the instrument has been at times productive of such lesions.

The resort to the forceps when the head is movable above the brim, especially with a flat pelvis considerably narrowed, places in great danger the walls of the urethra, bladder, and ureters. Also the too frequent mal-direction of the force exerted in traction with the forceps, as when this force is directed against the anterior pelvic wall, produces contusions and sloughing of the soft parts, including, at times, the walls of some part of the urinary apparatus. The contusion may be suf-

cient to produce a fistula, or it may less seriously yet injuriously affect the urinary structures.

Were the axis-traction forceps in universal use, as in my opinion they should be, the mal-directed and too great force so often resorted to in traction would be avoided, and consequently the pressure exerted would be less prolonged and less forcible. At times a fistula may result from excessive pressure exerted even for a short time, especially if the bladder is partially or greatly distended.

Prolonged or undue pressure during labor may also give rise to erosion or ulceration and inflammation of either urethra, bladder, or ureter. These structures are liable to serious injury during the performance of craniotomy, from being punctured with either spiculæ of bone or with the perforator.

The performance of version and of extraction by the feet has resulted in rupture of a distended bladder, and in other instances in sloughing, productive of fistulæ, or of vaginal cicatrices which interfere with the functions of the bladder.

Vesico-intestinal fistulæ have sometimes followed labor in cases of old adhesions between the bladder and some part of the intestinal tract.

In the performance of the classical Cæsarean or of the Porro operation the bladder and ureters should always escape injury, unless there exists a patulous condition of the urachus.

In a large proportion of the cases of cœlio-elytrotomy the bladder was opened into, and the danger of this accident occurring was one of the several good reasons why that operation quickly fell into disfavor.

Occasionally a calculus exists in the bladder during labor, and its presence at that time always brings considerable danger to the patient. It is advised by some to endeavor to push the calculus upward above the brim, but it seems to me that this procedure would often be impossible of performance, and would be always of uncertain benefit. Extraction through the urethra after dilatation, preceded, it may be, by lithotrity, would promise the best result. Or, if this were impracticable from the low and fixed position of the head, vaginal, or, possibly, supra-pubic lithotomy, would be indicated. If the stone could not be carried above the brim the supra-pubic operation would not be possible. I can scarcely understand how the circumstances can be such as to justify the performance of craniotomy, the child being alive and viable.

During the puerperal period perforation of the ureter, bladder, or

urethra may arise from ulceration or from sloughing due to injuries sustained during labor. In fact, most fistulæ do not appear until several days have elapsed. In some instances by judicious treatment, especially with vaginal antiseptic douches, such perforations may be avoided. This is effected by lessening the intensity of the ulcerative and inflammatory processes. The liability to cystocele may be lessened by proper observance of recumbency and by immediate perineorraphy, if indicated. The measures influential in securing due uterine involution may be said to be generally favorable to the establishment of a normal condition of the urinary apparatus.

The inability to empty the bladder, so frequently existing during the few days following labor, may be due to one or several causes. At times swelling of the urethral wall may be the principal cause, though I do not think that this is frequently the sole cause. Often the loss of support sustained by the bladder due to the emptying of the uterus occasions the retention, while in other instances recumbency is chiefly at fault, for not a few women are unable to urinate at any time while recumbent.

It is best that the bladder should be evacuated every eight hours after labor.

If the labor has been a normal one, it is safer for the patient to be placed on the commode without being on her feet than to use the catheter. Nearly always the sitting posture will enable her to urinate. The use of the catheter after labor brings peculiar risks. Septic urethritis, cystitis, ureteritis, and nephritis, one or all, have certainly been thus produced, and not infrequently. The catheter often causes abrasion, and although absorption through the urinary mucous membrane in its normal condition must be exceedingly slow, yet when this membrane is congested, but especially when abraded, absorption readily occurs. Practically the physician is never certain that the catheter is aseptic unless he cleanses it himself, and even then he must have correct knowledge as to how the instrument can be cleansed. Many nurses are either careless or ignorant, and the catheter is not easily kept aseptic. Moreover, the catheter may be perfectly clean, and yet it may pick up from the external genitals after labor septic material, or material that will quickly become septic, and carry it into the bladder. The custom, still recommended in some text-books, of passing the catheter under the bed-covering, is exceedingly erroneous. If the catheter must be used, the genitals and urethral meatus should be exposed and rendered entirely clean, and the clean catheter should be introduced with the parts in view—for only in this way can one

guard against the introduction into the bladder of foul material. Hence, unless the contra-indications are plain, the patient should be placed on the commode, or in the sitting posture on a vessel in bed, or in the knee-elbow position, if she cannot urinate in a urinal or a bed-pan. After primary perineorraphy the patient should be permitted to urinate spontaneously while lying on the bed-pan, and immediate douching of the external parts will prevent decomposing urine from interfering with primary union.

A catheter should be perfectly smooth, and with small orifices near the distal extremity. Some writers prefer the gum catheter. The best is of glass, and each patient should have a new one. The glass catheter can be more easily and more certainly rendered aseptic than the gum. Cystitis after labor determines subinvolution—may lead to urethritis, and possibly to pyelitis, which may rapidly terminate fatally, or become chronic, with eventual loss of life. An active inflammation of the bladder, especially after labor, may be productive of pericystitis or pelvic peritonitis and of pelvic cellulitis. Chronic cystitis in the female often dates back to the lying-in. Stricture in the course of the urethra, or at the meatus, also finds its origin in a post-partum urethritis, or in external ulceration.

DISCUSSION.

DR. M. PRICE: I agree with Dr. Parish that the traction-rod forceps should be the only ones used. I disagree with the statement that bladder injuries in labor are more infrequent than formerly. I believe that they are more frequent. The reason that we see fewer of these cases is that in every town there is now a man who is able to close these fistulæ. In the last few years I have seen many injuries of the bladder that have not been recognized.

I agree with Dr. Parish that an intelligent attendant should prevent most, if not all, of these accidents by his knowledge and care of the parts involved, and his investigation of the condition of the bladder during labor.

DR. CHARLES P. NOBLE: I wish to say a few words in regard to the use of violence in forceps delivery when the head is high in the pelvis. I am satisfied that it is not uncommon for men to deliver with all the power they have. This undue use of force is certainly injurious to the bladder as well as to the other pelvic organs. If the forceps are put on before the cervix is well dilated, it is very apt to happen that the anterior lip of the cervix and the bladder are drawn down in front of the head and are in great danger of contusion. So far as primary injury of the bladder is concerned, I am satisfied that not a few cases are due to great force used in delivery. I quite agree that the amount of force required can be lessened by the use of traction forceps. I think that too much cannot be said about the inadvisability of

trying to deliver a large head through a small pelvis by the use of great force. This subject has been agitated recently by the introduction of a new forceps by Dr. McGillicuddy, called the "anti-craniotomy forceps," to be applied to heads too large to come through a given pelvis. The idea of drawing children through pelves relatively too small cannot be condemned too strongly. The natural result is serious or fatal injury to the mother and a dead or "spoiled" baby.

I was brought up with the idea that after delivery a woman should not be permitted to move, but under the teachings of Dr. Goodell and others I have allowed women more latitude, and have seen no reason to regret it. Very often if a woman turns over on her elbows and knees she can lean back and pass water in a chamber placed between her feet, without getting out of bed. Of course this should not be permitted in feeble women, or where there is danger of hemorrhage. In this way the use of the catheter can be avoided, and likewise a possible catheter-cystitis. The position likewise favors drainage of the lochia, and hence is an efficient and natural antiseptic precaution. Women who are allowed some liberty in the bed are much more comfortable than under the old method of treatment.

DR. JOSEPH HOFFMAN: I am glad to hear a man of Dr. Parish's experience urge the use of the traction forceps to save the bladder. I use it always, and have never seen any injury to the bladder. It has been said that with the traction forceps less force is used. In reality more force is used, but it is applied in the line through which the head escapes, and no force is wasted on the soft tissues as is the case with the ordinary instrument.

DR. DANIEL LONGAKER: I consider the use of the catheter after labor as very undesirable, and my experience is that its use can almost always be avoided by allowing the patient a little liberty. I have had a series of fifty cases in which I did not once use the catheter. Then there occurred a case of premature labor in which the dilating stage was protracted and the second stage prolonged. That patient was unable to pass water without the use of the catheter.

The statement that injuries of the bladder are as frequent or more frequent than formerly is, I think, incorrect. I think that it is a fact that the Women's Hospital in New York owed its birth to the number of cases of vesico-vaginal fistula, and the treatment of these cases formed a large part of the work of the institution. Now the cases of that trouble treated there are very few indeed.

DR. PARISH: Dr. Price has unintentionally quoted me somewhat incorrectly. I did not say that injuries of the bladder were less frequent, but that vesico-vaginal fistulæ were less frequent. I do not believe that the injuries in the aggregate are less common. Prolapse is probably more common than before the general use of the forceps.

In preparing this paper I was compelled to refer to some points but briefly. In regard to sitting up or turning over on the knees after confinement, one must be careful that he does not permit a patient to sit up who should not. We must consider the individual cases; otherwise great harm would result.

THE RATIONALE AND TECHNIQUE OF SUPRA-PUBIC CYSTOTOMY.

By JOSEPH HOFFMAN, M.D.

[Read November 11, 1891.]

THE history of this now classical operation for all the affections of the bladder where surgical interference is justifiable is a travesty upon the acumen of the surgeon. I speak widely, and it may seem to some, unwisely, but it appears to me such expression is only moderate when all facts in reference to the subject are considered. The lateral operation for stone, as is well known, became popular because of its success upon children. Hence the reasoning by which it was indiscriminately applied to all cases in the adult seems only ridiculous when the same methods of arguing the so-called high operation out of sight are scanned. The high operation was dangerous because of wounding the peritoneum, and this was gravely held to, after it was well known that the operation had been performed at an early day with success and that the anatomy of the parts is such that the peritoneum is easily escaped. Up to within a decade the same logic is followed, and the supra-pubic operation is gravely dismissed with the feeble criticism that the statistics of the operation are not good, though such condemnation is followed generally with the explanation that this is perhaps due to the fact that the operation has been reserved for cases in which other operations could not be done, and accordingly the patients were in an unfavorable condition. It is not the intention of this paper to go into the history of the operation, only as to show that the reasoning against it, both present and past, is in the highest degree unworthy of acceptance and in fact does not amount to reasoning at all. It is intended rather to call attention to the fact that in the opinion of the advanced surgical exponents of to-day it is the operation, beside which all others, in the treatment of vesical disease, must play an unimportant part. Here in Philadelphia we have had much urgent opposition to the acceptance of this fact,

but also, it is pleasant to know, that here also there has been much and well-argued stand taken for the operation. In this connection Dr. Dulles must have unstinted credit.

It is too much the fashion in surgery, as in physic, to follow out an ancient idea as if it were inspired. The mummies of science are no more worthy of adoration than error in any other form. So-called scientific data which are not and never were scientific, are at the bottom of much mischief and many disasters in practical surgery as well as in physic. The arguments by which the supra-pubic cystotomy can be urged for general acceptance in all cases in which it is proposed to enter the bladder, are all based upon anatomical fact and practical results in good hands. Those who are having the most experience with it are giving it the highest praise. Looking at the now generally accepted axioms of this latter-day surgery it is difficult to understand how this can be otherwise. In the perineal point of attack by which the bladder is to be entered there are many structures of vital importance and whose anatomical distribution are far from uniform. On the other hand, in the supra-pubic operation, there are no important structures to be met; there are no bloodvessels that cannot be easily controlled in the sight of the operator; there are no anomalies to be expected, and if they do occur, need have no terror for the operator. The operation then being always under the complete control of the operator, is clearly the one to be preferred from a merely theoretical standpoint. But theory does not always hold good in practice, so let us see whether here we are also misled. The danger most to be dreaded from the perineal operations are hemorrhage and contusion of the parts by the passage of a large stone, especially injury to the seminal vesicles. In the procedure under consideration we have seen there is no danger from hemorrhage, and the contusion cannot interfere with vital structures because they are not met; the bladder is not wounded where its integrity is interfered with, and even if a stone larger than is suspected is to be dealt with, there is no difficulty in removing it far more successfully and certainly and simply than by any other method. I do not except the now generally accepted method of crushing. The reasoning by which this conclusion is reached I think so clear that I will not follow it out. How many of the older operators in this Society, in this room, have in mind harrowing attempts to get control of calculi imbedded in the bladder, of hands introduced into the rectum, in order to bring the stone into the grasp of the forceps, of lacerated bladder, perineum, urethra, and all of which it is the hope of the operator to escape! It will be

evident to the veriest tyro in anatomy that all this not only can be escaped, but is escaped, in the supra-pubic operation.

The next *bête noir* of the perineal operation is urinary infiltration. It cannot be questioned that in this latter operation the larger the stone the greater the danger of contusion and, therefore, the greater the danger of urinary infiltration. Now, in supra-pubic cystotomy, the danger of infiltration is practically nil, for the reason that there is no deep dissection of parts, that the urine passes gently upward and outward, and cannot lie collecting and dissecting by gravity into the adjacent structures. The danger of infiltration in the suprapubic incision can only be said to obtain when an attempt is made to close the incision, and hence it has become an axiom in the operation that the incision is better left open. There is found to be but little danger of fistulæ—in fact, the great difficulty is to keep the bladder open as long as necessary. Accordingly we see that the three paramount dangers of the perineal operation are absent in the abdominal operation, and that theory and anatomical facts combine to demonstrate the legitimacy of the newly adopted operation. Now let us further consider some of the points in which it is asserted that the lateral operation for stone is superior. In children, for instance, where there is less danger of extensive laceration, it is claimed such is the case. Let us see. A year ago I said to Dr. Deaver: "I am going to do a suprapubic cystotomy for stone." The question was: "What is your case?" The answer was: "A boy, three years old." Again the answer: "You have a favorable case," and the opinion was justified by the result. It must be remembered that in children the bladder is rather an abdominal than a pelvic organ, and that lying higher it is more readily reached. In the case just referred to the recovery was absolutely uneventful. After the first day the child lay comfortably in bed, playing, with neither fever nor pain. In great contrast with this case comes the report in a volume of the *Transactions of the Southern Surgical Society* in which a vaginal cystotomy was done upon a child six years old. Imagine the consequences at their best—the laceration, the pain necessarily supervening; but take into consideration subsequent operation for vesico-vaginal fistula, and the too late concession of the operator, that had the size of the stone been suspected, the supra-pubic operation would have been selected. Herein lies the folly of choosing any operation instead of another which will answer all conditions, because in tradition no alternative has been preserved. I take it to be a surgical postulate that in every instance that operation should be selected which promises the greatest relief with the least

danger or discomfort to the patient. It is not a question of what operation we are used to performing. It is which operation best covers the ground. The argument has, up to this point, been directed to cystotomy from the standpoint of operation for calculus. It is not limited to this, however. In the male we have prostatic disease, than which there is no greater bane to old age. Hitherto the only relief was by constant catheterization. Now it is a recognized procedure to drain the bladder permanently from above. No one needs further argument than the cases reported by McGuire, of Richmond, and of the Davises, of Alabama, to be convinced that this operation to old men is the greatest possible boon. Not only is the bladder drained, but the prostatic enlargement is itself removed with the greatest success, and in many cases the disease permanently cured. Belfield, of Chicago, a year ago gave an exhaustive tablature of this operation, and its success places it among the most important additions of the day. It now becomes evident that since drainage is a most important element in the treatment of chronic cystitis in women, a most desired step is attained, by which the woman with comfort and cleanliness is able to go about while she is being cured, with no discomfort, and cleanly. McGuire gives as his opinion that there is no difficulty of so managing the supra-pubic opening that the urine can be retained for six hours. This being the fact, there is no longer reason for drainage *per vaginam*. By this it will be seen that in all cases in which it is intended to open the bladder the suprapubic operation gives most assurance of all-round success, whether in adults or children, whether the disease be simple inflammation or chronic prostatic enlargement. This is my experience, both in operations upon the child and adult. It is evident also that in lieu of an encysted calculus the operation is absolutely sure of success.

The details of the operation are exceedingly simple. Much has been written that tends to produce an impression that the steps are more or less complicated. No special instruments are needed. A bistoury and a few artery clips are all that is required—additional instruments only being called for according as to the conditions met after exploration. The injection and washing out of the bladder are, I believe, all that the surgical aspect of the operation requires.

The bladder can be easily reached both in the child and adult without packing the rectum. The relative size of the bladder in the adult and child is to be regarded, care being taken not to over-distend the viscus. The incision is made close down to the pubis, and two pairs of artery forceps used as retractors, as the incision is deepened, obviate all

necessity for special instrument or additional procedure. The supra-pelvic fat is pushed asunder with the finger, and the bladder comes into view or is easily felt at the bottom of the wound. The viscus is easily raised into the wound by the forceps applied again after the manner of using them to raise the peritoneum, and the incision is readily made. The forceps can still be retained in position or, if deemed expedient, a thread can be introduced by which control over the edges of the wound is maintained.

The subsequent procedure is now dependent on the operation to be done. If drainage only is intended, a rubber tube is stitched into the wound or a hard drainage-tube retained by simple means. If a calculus is to be removed, the procedure is as simple as taking a cherry from its seed.

The operations for tumor and prostatic disease are, of course, more extensive and dangerous, and these it is not the purpose of the paper to consider, but only to call attention to the fact that their removal by this operation becomes more a matter of surgery and less of experiment than by any other means whatsoever.

Finally, for the operation all can be claimed that simplicity, accuracy, and safety can commend. The so-called statistics of the operation before it was fairly tried, or used for other than forlorn cases, cannot be used either to condemn or recommend it. Its results, as obtained at the present time by exact surgeons, working thoroughly and entirely from an anatomical standpoint, give it a record unequalled by any other method of dealing with the surgical diseases of the bladder.

DISCUSSION.

DR. JOHN B. DEAVER: Simplicity should not, under all circumstances, be the best recommendation of an operation. I grant that many do supra-pubic cystotomy because it is simple. The left lateral operation is also simple. I have never had a death from the operation; I have never seen the dangers to which Dr. Hoffman refers. Uncontrollable hemorrhage and extravasation should not occur. The greatest danger was not mentioned by him—that is, wounding of the spermatic duct.

There is no one operation for stone in the bladder, but each case must be judged on its merits. The ideal operation for stone in the bladder is litholapaxy, after which the patient can usually be up in five days. It, however, requires experience and manual dexterity. To do it successfully requires that one should have done it several times. Anyone can do the supra-pubic

operation. It is, however, not simplicity alone, but the merits of an operation that should determine its value.

DR. M. PRICE: Dr. Deaver has given us the strongest reasons why the supra-pubic operation should be selected. The fact that anyone can do it must be an argument in favor of the operation.

An argument against the perineal operation is the fact that in fifty per cent. of the cases of that operation the spermatic duct is injured. The supra-pubic operation has no such risk, and there are no large vessels which may be injured, as is the case in the perineal operation. The supra-pubic operation, also, is preferable to crushing. Sir Henry Thompson has had a number of deaths, although he has crushed many cases.

DR. JOHN B. ROBERTS: I feel that I am almost entirely in accord with the reader of the paper. Ever since the publication of the paper of Dr. Dulles, some fifteen years ago, I have felt that the supra-pubic operation was a most desirable one. He soon convinced me of the correctness of his position upon anatomical grounds. In a discussion of this subject before the American Surgical Association, in Washington, in 1884, gentlemen of skill and experience took the position of Dr. Deaver, that it was a good operation, but that the operation *par excellence* was the perineal incision. Dr. Tremaine, who read the paper favoring supra-pubic operation, was entirely in the minority. At that time I said: "I venture to say, that within ten years the supra-pubic operation will be the operation adopted for all cases of stone that are not treated by Bigelow's operation." This was before the brilliant results of supra-pubic cystotomy for tumors of the bladder and enlarged prostate. The supra-pubic route is certainly the most desirable for those who are but seldom called upon to remove cystic calculi. Those who have undertaken to teach students perineal lithotomy, well know that such inexperienced persons almost as often get between the bladder and rectum as into the bladder. The upper route is accompanied by few complications and gives an opportunity to explore the bladder. From my experience I would say that it is the easier operation and the better one for the tyro.

DR. A. H. HULSHIZER: I have seen only two cases in which crushing succeeded, but I have seen four in which it failed; in two cases the lateral operation was resorted to, and in two the supra-pubic incision. I think that the supra-pubic is far better than even crushing.

DR. G. BETTON MASSEY: Hypertrophy of the prostate is often regarded as a hopeless condition, both from a medical and a surgical standpoint, and as this opinion was expressed also by Dr. Tyson, I may be pardoned for alluding to it in connection with cystitis. I have recently had two cases of cure of prostatic enlargement. The first case was that of a gentleman seventy-three years of age, who was sent to me some years ago with an old-standing enlarged prostate. He was treated by me after the somewhat well-known plan of mild negative electrolysis in the urethra. The applications were made twice a week, the current-strength being from five to ten milliampères. I subsequently increased the dosage to twenty-five milliampères, which produced considerable irritation. The duration of each application was from three to five minutes. This was repeated three or four times, when I lost sight of the case. Two years afterward I met the physician who sent him to me, and learned that the patient claimed that he was entirely well.

The second case was that of a gentleman seventy-four years of age, who for two years had dribbling of urine, and finally had complete retention, necessitating the use of the catheter. The prostate was so large as to interfere with defecation. There was complete retention but no true cystitis. In this case I applied to the prostatic urethra a current of from twenty-five to forty milliampères at once, with the negative electrode, consisting of a silver prostatic catheter so insulated as to leave an inch bare near its extremity. There was hardly any sensation of pain and no irritation following the application, and the absence of irritation was because the current was simply turned on and then off. I did not use electrolysis, but a galvanic constringing current. I obtained a galvanic effect on the semi-muscular organ. I also used the faradic current and the galvanic current in the rectum, employing from forty to seventy milliampères in the same "swelling" method. As a result of a month's daily treatment, the gentleman empties his bladder completely, and the prostate is shrunken two-thirds. If we have an agent which can contract the organ as a whole, its use is certainly preferable to an operation which ablates only one part.

DR. HOFFMAN: The key to the situation is, that Dr. Deaver uses tradition and not logic. Dr. Ashhurst, in the last edition of his *Surgery*, does not recognize the importance of the operation. Dr. Agnew, in a paper in the *University Magazine*, uses the expression that he does not see the sense of going into a house by the roof when you can get in by the cellar. It, however, does make a difference if there is dynamite in the cellar.

There is one other claim for the supra-pubic operation, and that is its use to afford drainage after operations on the male urethra. In all such operatiohs there is great danger of extravasation, especially when a new urethra is to be made. By supra-pubic incision, this danger can be avoided and the wound can be attended to properly and healed without the additional danger of urinary infiltration and irritation.

PENETRATING WOUND OF THE BASE OF THE BRAIN THROUGH THE LEFT ORBIT; HEMIPLEGIA; REMOVAL OF CLOTS FROM THE BASE OF THE BRAIN: RECOVERY.

By ERNEST LAPLACE, M.D.,

PROFESSOR OF SURGERY, PATHOLOGY, AND CLINICAL SURGERY IN THE MEDICO-CHIRURGICAL COLLEGE; SURGEON TO THE PHILADELPHIA HOSPITAL, ETC.

[Read November 25, 1891.]

R. B., aged ten years, whilst at play on the lawn of his parents' country residence, fell on a broken fencing foil. The steel penetrated the left orbit between the inferior orbital ridge and the eyeball. The child was found a few moments later in an unconscious condition, with the instrument still in the wound. It was removed by a servant, and the child placed in bed.

I saw the case about five hours after the accident, Dr. Keyser, who was first summoned to the case, declaring, from an ophthalmoscopic examination, that the eyeball proper was uninjured.

There was coma, right hemiplegia, left facial paralysis, complete aphonia; respiration 30, pulse 140, temperature 104½°. Immediately above and about the centre of the left orbital ridge was an incised wound about one-quarter inch wide from which oozed a little blood. Having but very meagre details of how the accident occurred, an exploration of the wound was determined upon. The patient being etherized, the cutaneous wound was slightly enlarged, and the handle of a Graefe cataract knife was inserted into the wound, and sank almost by its own weight to a length of three and one-quarter inches into the wound, taking a superior and internal direction.

Inasmuch as no spiculæ of detached bone could be detected, the probability was that the instrument passed through the sphenoidal fissure, thence entering the base of the brain. The eye was apparently uninjured. There was, however, complete anæsthesia. Pupil dilated; insensible to light.

Having consulted with Drs. Keyser, Anders, and Shelly, it was determined to adopt the expectant plan of treatment; six ounces of blood were, however, extracted from the left median basilic vein.

May 17 (night of accident). Great jactitation of uninjured side of body. Quieted with ⅛ gr. morphia sulph. hypodermically, repeated in two hours. Temp. 103°, pulse 120. 5 grs. quinine suppositories; peptonized milk 2 oz. every three hours.

20*th*. Temp. 104⅘°, pulse 110, resp. 30. Sponged every fifteen minutes.

5 grs. quinine suppositories; $\frac{1}{6}$ gr. calomel three times daily; peptonized milk. Jactitation continues; coma continues.

23*d*. Temp. 99.6°, pulse 100, resp. 26. General condition unchanged.

25*th*. Temp. 98.6, pulse 72. Collapse. Cold extremities; cold sweat. Teaspoonful of brandy every half hour.

27*th*. Collapse. Temp. 96.8°, pulse 72. Brandy; $\frac{1}{60}$ gr. strychnine sulph. hypodermically every two hours.

During the intervals of collapse there was great restlessness. Great emaciation had taken place, and there was not the slightest improvement in the general condition of the patient. Judging that at least some of the symptoms were the result of compression from a clot at the base of the brain, and wishing to offer a surface for the relief of tension within the cranium, trephining was resorted to on May 30th, thirteen days after the accident.

Operation. From the direction taken by the instrument it was evident that it had penetrated the middle fossa, and that hemorrhagic clots should be sought for in that locality. Accordingly, the patient being etherized, a horseshoe incision three inches long was made in the temporal region, down to the level of the zygomatic arch, and the tissues were lifted *en masse* from the bone. The trephine was rested on the middle of the zygomatic arch, and a three-quarter inch piece removed, consisting of the temporal bone and a small fragment of the sphenoid; the dura mater appeared very congested.

To reach the centre of the base of the brain for the removal of the suspected clot, a miniature egg-beater, consisting of four loops of platinum wire, had been improvised; this was perfectly malleable, and could be insinuated between the dura mater and skull without wounding the structures. Having reached the cavernous groove the instrument could be pushed no further; it was then turned on its axis for the purpose of catching the coagula in its loops. This was effectually done, and about a teaspoonful of clotted blood was removed piecemeal.

Whilst dragging more out, considerable venous hemorrhage took place, most probably as the result of the removal of the clot that occluded the injured cavernous sinus.

The trephined opening was immediately plugged with iodoform gauze, and a graduated compress applied over it, secured by a tight bandage about the head.

May 31. Patient reacted well after the operation. Temp. 100°, pulse 72, resp. 22. Very restless.

June 3. Temp. 98.2°, pulse 80, resp. 24. Vomiting. Milk enemata every two hours. Dressings saturated with blood and serum. Slight return of consciousness; patient notices sounds.

8*th*. Temp. 97.6°. On dressing the wound the patient makes signs with uninjured hand, recognizing things about him.

11*th*. Temp. 97.8°. After an apparently great effort patient articulated a few words. Dressing completely saturated with serum. Motion has gradually returned in affected limbs. Hypodermic injection of strychnine sulph. $\frac{1}{60}$ gr. twice daily. Patient greatly emaciated.

15*th*. Temp. 97.3°, pulse 64. Speaks more distinctly. Memory remarkably clear; reason perfect. Dressings daily saturated with serum.

July 1. Patient's condition has steadily improved; voracious appetite. Massage, electricity, and general inunctions with cod-liver oil to increase nutrition.

10*th*. Secretion has ceased from the wound. A plastic operation was performed under ether by which the wound was closed. Union by first intention, except at the most dependent portion where a sinus remained about one month, giving exit to slight serous exudate.

September 1. Patient sits at table. Wound completely healed. Has gained fifteen pounds. Remarkably bright and cheerful.

November 15. Has apparently equal use of both inferior extremities. Can stand and make a few steps without support. Pupil of left eye somewhat contracted. There remains anæsthesia of the eye and internal strabismus, showing an injury to the ophthalmic division of the fifth pair which supplies sensation to the eye, and an injury to the sixth pair which supplies the external rectus, giving a paralysis of this muscle, hence internal squint, thus corroborating our suspicion that the foil penetrated through the sphenoidal fissure. The improvement continues so steadily that everything points to an ultimate complete recovery.

I must here render thanks to Dr. James M. Anders, of Philadelphia, and to Dr. Shelly, of Ambler, Pa., for their unremitting aid in carrying out the medical treatment of the case.

REMARKS.—1. From the direction taken by the instrument producing the injury, it is probable that it passed through the sphenoidal fissure, wounded the cavernous sinus, the crus cerebri and entered the left lateral ventricle.

2. The hemiplegia was due to venous hemorrhage and laceration of the crus cerebri and other structures, no spiculæ of bone being detected.

3. The coma, hemiplegia, aphonia, and progressively unfavorable course of the patient were relieved after trephining low in the temporal fossa, lifting the brain, and removing blood-clots from the seat of hemorrhage.

4. The vast amount of oozing and secretion from the opening, was evidence of the great intra-cranial tension and of the absolute necessity of drainage.

5. Consciousness returned shortly after the relief of the intra-cranial tension. Phonation and articulation soon followed.

6. The brain is situated in an unyielding box of the cranium, and therefore when exposed to a great irritant, little allowance has been made by nature for the resulting expansion (congestion, swelling in other parts), following upon the irritant. With a view of remedying this condition, the brain if not in a position to expand freely as a result of the irritation, should by trephining be given an opportunity

of drainage, which meets the same object by offering a spot of least resistance to relieve the tension within the brain.

This principle applies to many cerebral conditions where symptoms of general compression are the result of a local or a general irritant, within the cranial cavity. That this principle found a happy application in the present case, is evidenced by the great serous effusion which daily permeated the dressings.

7. We wish to emphasize, the safety of trephining near the base of the skull, the ease of arresting violent hemorrhage from the sinuses of the dura mater, and the importance of drainage in all cases of cerebral injury.

8. To our knowledge there is no recorded case of trephining as low in the temporal region, and removal of clots from the base of the brain.

CLINICAL CONTRIBUTIONS TO BRAIN SURGERY.

By JOHN B. ROBERTS, M.D.,

PROFESSOR OF ANATOMY AND SURGERY IN THE PHILADELPHIA POLYCLINIC; PROFESSOR OF SURGERY IN THE WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA.

[Read November 25, 1891.]

In 1885[1] I took strong ground in favor of more active surgical interference in injuries and diseases of the cranium and brain. At that time the views advocated by me were looked upon as being too radical, and were quite vigorously opposed by many prominent surgeons of this country. Since that date there has been developed an unprecedented activity in the operative treatment of cranial and intracranial lesions, which, even in my opinion, has been too extreme. It is, perhaps, not difficult to understand this unscientific and unreasonable adoption of what might be called a surgical fashion. It is to be regretted that the enthusiasm created by success impels some men to interfere surgically in nearly all cases that come into their hands, without a judicious study of each particular patient. That unrestrained mania for operating which has made abdominal surgery almost a byword has, it seems to me, entered into the domain of cerebral surgery. It is just as much a part of scientific surgery to abstain from operating unnecessarily, as it is to combat vigorously the unreasonable conservatism of those who will not see the force of anatomical, surgical, and statistical evidence. Fortunately for the patients a healthy reaction is at last taking place, and surgeons are not now removing brain centres and tunnelling the brain in search of abscesses and tumors in quite as enthusiastic a manner as they were a couple of years ago. That such lesions should be promptly attacked surgically is unquestioned, but this should be done only after a thorough survey of the conditions and a judicial estimate of the gain that will possibly

[1] "The Field and Limitation of the Operative Surgery of the Human Brain," Annals of Surgery, July and August, 1885.

arise. The experimental character of many operations upon the brain in recent years has been almost as patent as in vivisectal operations done with an avowed experimental purpose. Death on the operating table and unsuccessful operations have at length begun to stay the hands of these over-enthusiastic surgeons; and there is now ground for hope that cerebral surgery will, ere long, become less reckless.

My personal opinions are very much what they were in 1885; indeed, the advances in diagnosis and the improvements in operative methods have made me even more sure of the correctness of the conclusions then advanced. I cannot, however, bring myself to approve of the reckless way in which human life is often threatened by operations which hold out scarcely a ray of hope to the helpless patient. The rapidity of healing in aseptic wounds and the tolerance of the brain under operative attack do not justify hasty resort to intra-cranial surgery simply because the patient or his family are submissive under the persuasive eloquence of the would-be operator.

I desire to-night to report a few cases which have a practical bearing on some of the fundamental principles of cerebral surgery, and I hope they will serve as a means of bringing out the views of others in this interesting field.

CASE I. *Trephining for cortical epilepsy apparently the result of traumatism; improvement, followed by death in five weeks.*—A child, twenty-nine months old, had sixteen months previously received a fall, and on the second day after the accident was seized with convulsions. Four months before he had been struck on the head by a falling clock, but no special symptoms followed this mishap. Since the second attack he had had spasmodic seizures occurring at frequent intervals nearly every day. He dragged the left leg a little, did not seem bright, and was still unable to talk. There was a slight tendency to draw up the mouth on the left side, and also an inclination to turn the head and body to the left. When his attention was directed to bright objects he would apparently try to look at them, but his eyes usually turned to the left. His hearing seemed to be dull, but so far as could be determined the cutaneous sensibility was unimpaired. No changes were found by ophthalmoscopic examination.

Dr. Charles K. Mills, who referred the patient to me, placed the child under observation in order to detect, if possible, the exact character of the spasms. He was watched carefully in several seizures. Usually he squealed at the beginning of the paroxysm and his face had a vacant look. The spasm began with a lifting movement of the entire body, as if with the muscles of the trunk, much like a sudden effort to rise from a recumbent to a sitting position. About the same time, as nearly as could be judged, the eyes and head turned to the left. The eyes did not keep to the left but oscillated with the jerking movements of the body; the head, however, continually turned

to the left. The left leg and arm were spastic in slight flexion and were lifted up and projected outward and forward. The limbs on the right side were flaccid, but were projected forward and upward with the jerking movements apparently communicated from the trunk and the left limbs.

Another description of the attacks records that the child awakened suddenly from sleep with a toss of the body, as if badly frightened, with the head and eyes at once turning to the left. The left arm was extended forward and upward stiff and rigid, with the thumb and little finger pointing backward, the other fingers being slightly flexed. Both legs were also tossed upward in the air, the left more projected than the right. His body was lifted up and down during the attacks.

It was difficult to determine any signal symptom or serial order of movements. The spasm was both tonic and clonic, and certainly most marked in the limbs and face of the left side. The movements of the leg and arm were those of projection and protraction, and were rather movements from the shoulder and hip than from and in the distal portions of the limbs. The movements of the head, trunk, face, and limbs were often nearly coincident, but the conjugation of the head and eyes seemed certainly to be most commonly the initial movement.

The above description is taken from a former report of the case.[1]

Dr. Mills thought that the symptoms seemed to point to a lesion of the area for conjugate deviation of the head and eyes, and certain associated movements of the trunk, thigh, and arm. It was, therefore, determined to trephine over the posterior portions of the first and second frontal convolutions.

After encircling the head with a rubber bandage to prevent hemorrhage from the scalp, I made an opening with an inch and a half trephine placed one and a quarter inches in front of the fissure of Rolando and a little to the right of the median line. Behind and below the opening so made I cut out another button of bone with a one and a quarter inch trephine. The spurs of bone between the two holes were cut away with forceps. One point of the aura was abnormal in thickness and rather more adherent than normal. This condition did not seem to be caused by a Pacchionian body.

A flap of the dura was raised. The pia mater was very œdematous so that it could be pitted with the finger. A thin, yellowish-white membrane was found lying loosely upon the pia-arachnoid and had probably separated from the dura when the flap of that membrane was raised. This abnormal membrane was removed. Small electrodes applied to the convolutions failed to induce contraction of the left arm. This electrical test was repeated but failed to give results, though no antiseptic solution had come in contact with the brain tissue before the electrodes were used. Incisions in the pia allowed the serum, which caused the œdema to escape. When the convolutions were thus clearly exposed there was no evidence of change in their structure or of any subjacent lesion. The dural flap was then sutured in position, and the portions of bone, which had been kept in antiseptic solution at a temperature of 105°, were replaced. Some catgut threads were laid beneath the buttons of bone and carried through the incision in the scalp to give drainage.

[1] Polyclinic, April, 1889, p. 299.

The child was under my observation for nineteen days, during which time there were only three epileptiform attacks and these were within two or three days after the operation. They were all slight and would scarcely have been recognized as pathological symptoms if the previous severe attacks had not formed part of the clinical history. A large amount of cerebro-spinal fluid escaped for several days through the opening left by the catgut drain, which was removed a day or two after the operation, and also through a small hole in the line of incision which had not healed by first intention as had the rest of the wound.

Bromide of potassium, calomel, and small amounts of alcoholic stimulants were given to the child during the after-treatment.

When he was discharged from under my immediate care his general condition was good, temperature normal, and there had been no escape of cerebro-spinal fluid for three days. The two small openings in the scalp were covered with small crusts.

Two weeks later the child died, but the history of the intervening period is unknown. I heard only indirectly of his death. No post-mortem examination was made, but indefinite information has come to my knowledge, which leads me to believe that suppuration under the scalp occurred.

This case is one of a class in which there is a great temptation to operate in hope of finding some removable lesion of the cortical centres. The findings are usually negative; and the results only temporarily satisfactory, even when the patient entirely recovers from the lesions incident to the operation. Unless the localizing symptoms and signs are more definite than in this instance, I think that in similar cases I shall hereafter be almost inclined to avoid operative interference. This provisional conclusion has been reached by a consideration of cases in the treatment of which I have been concerned, or with whose results I am familiar.

CASE II. *Traumatic epilepsy resulting from unsuspected fracture; trephining with discovery of an irregular projection of bone on the interior of the cranium.*—A man, J. H., aged thirty-four years, while working as a puddler, about eight years ago, received an injury on the left side of the head by being caught between an iron lever of a furnace-door and a brick wall. He was treated by no physician, and only lost about two days from his work, although the injured region was poulticed by him, and was the seat of a discharge for four or five months. No portion of bone came from the wound, and there were no special symptoms.

Several years ago he had venereal sores upon the penis, but no suppurating inguinal glands or syphilitic developments. Chills and fever, several years ago, constituted the only illness from which he suffered.

An examination of his head, after shaving, revealed several insignificant scars, and just above the zygoma on the left side, a half inch in front of the auricle, a depressed cicatrix sufficiently deep to hold the tip of the little finger. This was the scar left by the injury received eight or nine years ago.

The cicatrix involved the temporal muscle, as was seen by the dragging of the skin over the scar during mastication. There was no evidence of depression of the skull in any other part of the cranium, and this depression did not seem to involve the underlying bone. His intelligence was good; but the patient said that he did not remember as well as he could a few years ago, and that at times his eyesight was not good. He shows at times a little mental deterioration. An ophthalmoscopic examination of the eyes gave negative results.

The patient states that about two and a half years ago he had an epileptic fit after working in a hay-field on a hot day, and that since that time he has had marked seizures about every six weeks, with lesser attacks more frequently. He has but one epileptic fit at a time, from which he rapidly recovers, and is soon able to walk about. After such attacks he feels weak for some time. For several years he has had severe headache, not confined to any one portion of the head, and just before the epileptic seizure he feels a jerking sensation on the right side of the nose. He complains that his general health has deteriorated, but there is no apparent loss of flesh.

On the 26th of September of the present year (1891) I turned up a large flap of the scalp and found, after cutting through the temporal muscle, a depression in the skull one inch in length and three-eighths of an inch in width. This fracture was a surprise to me because of the history of the case and the situation of the injury over the thick belly of the temporal muscle. A three-quarter inch aseptic trephine was applied above and behind the depression. This cut through the bone with some difficulty, because the upper portion of the disk was much thicker than the lower part. Unfortunately my segment trephine had been forgotten, or this part of the operation could have been more expeditiously performed. Thinking I had cut entirely through the skull, I endeavored to pry out the disk, but removed simply the outer table of the button; I found that between it and the internal surface there was a portion of fibrous tissue entangled. It was probably this portion of tissue entangled in the bony cicatrix as a result of the fracture at the time of the injury that enabled me to lift out so readily the upper surface of the bony disk. The entangled tissue was doubtless pericranium. Removal of the interior table of the disk revealed below and in front of the opening a teat-like elevation projecting from the lower surface of the skull and pressing upon the dura. This elevation was about one-fourth of an inch higher than the general surface of the interior table, and was the apex of an irregular elevation due to consolidation of a number of comminuted fragments of the inner table. The irregular lines of fracture, with the fragments displaced in varying degrees, are shown on the button removed and the rest of the bone subsequently cut out with gnawing forceps.

The specimen shows this condition very satisfactorily, though somewhat mutilated by the gnawing forceps with which the adjacent bone was removed after the original button was taken out. The depth of the skull wound and the thickness of the temporal muscle made it rather difficult to operate neatly, and my desire to get rid of the portion of bone pressing upon the dura, without prolonging the operation or increasing its severity, caused me to sacrifice the specimen in the interest of the patient. The dura was not opened, threads of catgut were used for drainage and a dry sublimate dressing was applied.

The following day the wound was found to be healing by first intention, and the drainage threads were removed. Bromide of potassium and chloral were given for two nights; and then twenty grains of bromide of potassium three times a day were ordered as a continuous treatment.

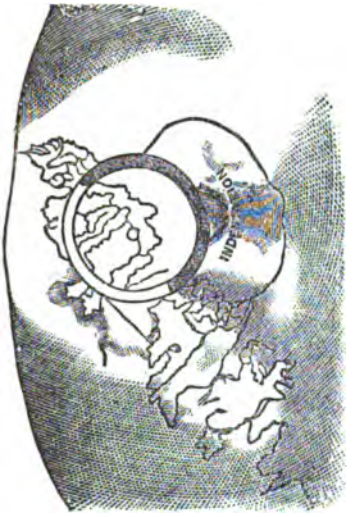
On the third day after the operation the patient had a sensation of twitching at the side of the nose similar to that which formerly preceded the epileptic seizures; but he had no fit. The wound healed by first intention, the temperature never rose above 99.6°, and on the eleventh day after the operation the patient was sent to his home in the centre of the State. He felt exceedingly well after the operation and expressed his satisfaction at the improvement of his condition. I suggested that the bromide treatment be continued by his physician, Dr. J. P. McCleery, under the idea that removal of the surgical cause of epilepsy should be looked upon as only a part of the treatment. I believe that in all such cases internal treatment should be combined with surgical procedures, and that the epileptic habit should be controlled by a prolonged course of bromides after the mechanical cause has been removed.

Seven and a half weeks after operation his physician reported that he had suffered no return of his epilepsy and was about to return to work. As far as it goes this statement is gratifying, but much more time must elapse before we can feel sure of a cure having been effected. The lesion is certainly one of those in which trephining ought to be eminently beneficial. Punctured fracture such as this should always be subjected to immediate trephining at the time of injury.

Upon this card is a representation of the external and internal appearance of the skull in a case trephined by me some years ago. There was a small scalp wound through which I could with my finger-tip feel what I thought was rough bone. I found by incision that the roughness was due to an unusually irregular lambdoidal suture with Wormian bones; and that the only bony lesion caused by the blow received from the pitcher, with which the patient was struck, was a small dent looking like the opening for the entrance of a vein. The character of the vulnerating force, however, induced me to trephine. The removal of the trephine button and the insertion of a probe between the dura and the cranium discovered nothing except a small fissure on the inner surface of the disc. Death occurred within a short time from alcoholic delirium; and the autopsy revealed a T-shaped fracture of the inner table with a shelf-like detachment of quite an area of bone. If this patient had lived he would probably have had secondary epilepsy, as occurred in the case just reported. The urgent necessity of primary trephining in such punctured fractures, even when no symptoms are present, is fully illustrated by these cases. The many deaths from cerebral abscess and other inflammatory processes, following the receipt of punctured fracture of

the cranium, long ago justified the surgical conclusion that trephining in such injuries should not be delayed until the advent of symptoms of encephalic inflammation. The epilepsies resulting in cases which have escaped the immediate dangers of encephalitis add another argument to the wisdom of immediate operation in punctured fractures.

FIG. 1.



Outer surface of fractured cranium showing lambdoidal suture, point where trephine was applied, and small indentation, looking like entrance of a vein, made by the blow.

FIG. 2.

Inner surface of f actured cranium, showing cut made by trephine and large area of inner table driven inward under the small external indentation. The trephine has not cut entirely through the bone where the inner table is driven inward.

CASE. III. *Secondary trephining for traumatic epilepsy; death from aseptic cerebral inflammation.*—In June, 1891, I operated upon a man, J. T., aged twenty-eight, with the following history:

While working in a mine he had been struck upon the head with a huge mass of coal and rendered senseless. The attending physician, Dr. James D. Garvey, found a fracture of the skull, and upon the day of the injury removed a portion of the bone. According to the patient's statement he recognized no one for fourteen days, and was, therefore, probably unconscious during that time.

After consciousness returned his left arm was paralyzed, but gradually regained power. Eight months afterward he had an epileptic seizure, and has had epileptic paroxysms at irregular intervals ever since. He is aware of the approach of a convulsion by nausea, dizziness, and disorder of vision. Occasionally he has time, after the premonitory symptoms, to sit down before

the fit occurs. He thinks that he ordinarily falls in the convulsion, but he does not bite his tongue at such times, though he froths at the mouth and grinds his teeth. The attacks have occurred as often as one or two in a day, but he has gone as long as four months without a paroxysm. The opthalmoscopic examination reveals a normal fundus, clear media, and hyperopic refraction. He is unable to say in what part of the body the muscular spasm begins.

A large triangular depression is seen upon the right side of the head, the upper margin or base of which is one and three-quarter inches to the right of the median line and almost parallel to it. The apex of the triangle points downward and forward toward the ear. The anterior margin of the depression is near or a little behind the fissure of Rolando, and the centre of the depression is over the superior parietal convolution, or in that vicinity. The deepest portion of the depression is that near the middle line of the skull, at which part its depth is fully a half inch; the edge of the depression at this point is almost vertical. The inferior and posterior borders are less abrupt. The angle, which I have called the apex of the depressed triangle, is about two inches above the ear, and a little behind a vertical line drawn upward from the ear. The margins of the depressed area form an equilateral triangle, each side of which is about one and one-quarter inches in length. There are a number of other scars on the head, one or two of which radiate from this depression. There is distinct weakness of the grasp of the left hand, but no marked difference in size of the hand or the arm. The patient complains of the left hand feeling differently from the right. There is no muscular contracture and no apparent change in the electrical reaction or in mensuration.

On account of the epileptic attacks in this case I determined to operate and remove any apparent cause of irritation. If nothing abnormal was found, I intended to remove the cicatricial tissue in the bony gap and also the bony margin of the opening in the skull. Accordingly I made an elliptical flap in the scalp which disclosed a triangular depression in the skull corresponding with the indentation seen externally. This was filled in with fibrous tissue, which I dissected out of the bottom of the depression. The bone was so thick that the gnawing forceps could not cut away the edges, hence, I used an aseptic trephine and removed a disc one inch in diameter from one corner. Subsequently I made four small holes along the edge of the depression with a half-inch trephine and then was able to gnaw away the edges with gnawing forceps. The soft tissues were yellow, and pigmented in places with particles of carbon, evidently due to coal-dust ground into the wound at the time of the accident.

Before the operation pressure upon the scalp gave the sensation of a small cavity filled with air under the integument. It resembled the sensation experienced when a varicose vein is palpated. Removal of the skin over the gap in the cranium did not alter this tactile phenomenon. The yellow pigmented tissue, found as above mentioned, was not brain tissue; and when cut through disclosed what looked like the interior of an emptied cyst, because the inner surface of the tissue had a smooth, glistening surface. No fluid escaped or had escaped by puncture. After having dissected away a considerable portion of this material, and having removed the edges of bone

along the entire circumference of the bony opening I reached normal brain-tissue. Hemorrhage from the cerebral wound and from the periosteum was profuse. It seemed impossible to stop that which came from the brain and its membranes, which were fused together in an almost indistinguishable mass at the bottom of the deep hole. The triangular opening in the skull measured about two inches along each margin. The pulse became very feeble, counting 165 a minute. Prolongation of etherization and operation seemed unwise.

After unsuccessful attempts to stop the bleeding by ordinary methods, I concluded to grasp all the bleeding points with hemostatic forceps which should be left in the wound. This was done, and five forceps left in the wound with their handles protruding. Iodoform powder was dusted upon the surface of the exposed brain and strips of iodoform gauze packed into the cavity. A few sutures were applied after the flap had been replaced; the gauze strips and hemostatic forceps projected from one corner of the wound. A voluminous dressing of iodoform gauze and cotton was then applied and the patient put to bed. Seven and one-half hours after the operation the dressings were saturated with bloody serum, and, therefore, in order to avoid sepsis, I determined to reapply them and to remove the hemostatic forceps at the same time. This was done carefully, the gauze withdrawn, and the wound redressed with a dry antiseptic dressing. In drawing out the strips of gauze a little oozing of blood occurred, but this hemorrhage I did not think of sufficient importance to prevent my closing the whole wound with sutures and without drainage.

The next morning the patient showed great restlessness, but was in a condition of hebetude. He, however, made his wishes known when he desired to urinate. Bromide and chloral were given to control the restlessness.

On the second day respiration varied from 25 to 40 in a minute, and the temperature was 101°. During the day the patient's condition was fairly good, though he was difficult to control on account of his restlessness and irritation. The urine was passed unconsciously. A turpentine enema was given; bromide and chloral were continued. On the third day after the operation it was necessary to give the patient one-sixth of a grain of morphine hypodermatically, and to strap him in bed because of his tossing from side to side. During the day he became hoarse, and I discovered at the base of the right lung harsh râles, probably bronchitic. The temperature was now 101.6°, while his respiration was between 35 and 40.

On the fourth day after the operation the note is made that he slept after a hypodermic of morphine, one-sixth of a grain, and is quieter. Respiration 40 to 45. His breathing, however, was embarrassed and harsh, somewhat of the Cheyne-Stokes's type. At 7 P. M. respiration was 50; temperature 102°. The wound had been left undisturbed since the evening of the operation when the hemostatic forceps were removed. The rise in temperature and the patient's restlessness made me fear that there had been something amiss in my antiseptic precautions. I, therefore, determined to inspect the wound. Upon removing the dressing, I found the flap bulging and detected a feeling of fluctuation when my finger was put upon it. I expected to find pus under the flap, although the wound had healed by first intention. I tore open the union, but no evidence of pus existed; a soft aseptic clot of blood, however,

lay under the flap. I removed the clot and explored the cranial cavity through the operation wound with my finger in search for pus. The cerebral tissue was disintegrated and soft, but no purulent collection was found. I moved my finger in various directions in the pultaceous mass, and finally, when my little finger was buried its entire length, came upon a hard mass at the bottom. This, I presume, was one of the great ganglia. The tissue overlying this part was almost fluid. There was no odor of decomposition nor evidence of pus. At the time of this exploratiou the patient was moribund, and I felt fully justified in these radical measures. Unless I found pus he was sure to die.

The dressings were reapplied; hypodermic injections of strychnine were given. Respiration gradually failed and the patient died the next morning, which was the fifth day after the operation.

It seems hardly possible that the fatal symptoms were due to pressure from such a small amount of hemorrhage under the flap, since there was much space by reason of so much bone having been cut away; and, moreover, the blood, if causing tension, would probably have readily escaped before the wound had united. I concluded, therefore, that death occurred from a septic cerebral inflammation leading to disintegration and softening of the brain tissue. The pulmonary symptoms may have been secondary; or he may have had a congestion, preliminary to an acute pneumonia, acting as a prominent feature in the fatal result. Rapid respiration was certainly an early symptom.

The case is to me exceedingly instructive, because the indications for operation were clear, and because death occurred notwithstanding what seemed to be perfect aseptic conditions of the wound, during its entire course. It is a good illustration of the fact that modern surgery has not rendered serious operations entirely devoid of dangers. The diminution of the death-rate in operations has been great in recent years, but certainty of recovery is by no means as absolute as some reporters of operations would have us believe.

The next case is reported because of the youth of the patient.

CASE IV. *Trephining for depressed fracture of the skull in an infant seven months of age; recovery.*—A mother, while carrying her seven months' old child along a railroad track, fainted or had epileptic seizure, and fell, dropping the child. When she regained consciousness the baby was whining and fretting a little, but did not seem badly hurt. After the mother reached home and removed the child's wraps she discovered a large indentation of the skull on the right side of the head, which she supposed was due to the child's head having struck against a railroad tie, or upon the iron track. The baby did not have any symptoms of brain implication.

When seen by me on the next morning the infant was perfectly comfortable, had slept well all night, played as usual, and had a good appetite. The

mother believed the depression to be less marked than when the accident occurred. Examination revealed an irregular depression in the parietal and occipital region on the left side of the head. The lower extremity of the vertical diameter of this depression was about 2 centimetres above and 5 centimetres back of the top of the ear. The depression extended upward 6 centimetres. The horizontal diameter—that is, that parallel to the sagittal suture—began at a point near the anterior portion of the posterior half of the parietal bone, and extended backward 6 centimetres, very nearly bisecting the vertical diameter. The depression at its deepest portion was fully a centimetre below the surface of the skull.

At this time the patient's temperature was normal; pulse 120. During the night two grains of sodium bromide were given because of slight restlessness. The bowels were opened by a soap suppository.

On the second day after the accident I found the child feeling well and the depression less marked than on the previous day, when I made the first examination. I felt unwilling, however, to let the injury go without surgical treatment and therefore determined to make at least an exploratory incision, because the injury had been so severe as to make a very deep depression. The possibility of secondary symptoms, such as epilepsy or impaired intellect, seemed to me to indicate this slight operative interference.

An Esmarch's bandage was carried around the head before the incision was made to prevent bleeding. A horseshoe flap was then dissected up at the point of injury. The bone was markedly depressed, showing a condition similar to green-stick fracture. I thought I could cut through the cranium with a strong knife but found it necessary to use a trephine. A small trephine opening was made through very thin bone at the anterior edge of the depression and the portion pushed down upon the brain easily elevated with the end of a grooved director. A few bleeding arteries were twisted, and the edge of the scalp wound drawn together by catgut sutures. Boric acid powder and dry sublimate dressing was applied.

The patient reacted from ether promptly and went quietly to sleep. Two grain doses of sodium bromide were given at intervals until ten grains had been taken. The patient was restless through the night, but a few drops of paragoric quieted him. The bowels were kept open by injections of oil.

The temperature the day after the operation reached 101.8°, but soon all symptoms of fever disappeared, and on the seventh day the dressings were removed. The wound was found to have healed by first intention without suppuration.

At the end of the sixteenth day the patient was sent to his home in New Jersey entirely recovered.

In this case the accentuated character of the depression was the factor which led me to adopt operative procedures, although I know the tendency for depression of the skull in healthy infants to correct itself spontaneously.

About eighteen months ago I saw a child who had received during birth a very marked indentation of the skull because the head had become locked on the promontory of the sacrum during delivery.

The depression was situated on the left side of the head, and included portions of the frontal and parietal bones near the anterior fontanelle. It was about two and a half inches long and quite deep. The case was one of difficult labor requiring forceps at the hands of Dr. Anna M. Fullerton, and the child, when born, was in the first degree of asphyxia, requiring the warm bath and artificial respiration. The child had frequent convulsions, beginning twenty-four hours after birth, evidently due to implication of the brain; yet I declined to operate because I thought that the indentation was probably not associated with actual fracture of the soft bone. The convulsions ceased within twenty-four hours, and although the patient was under observation for several weeks, I never could convince myself that operative procedures were justifiable. The depression gradually lessened and when the child was last examined by me seemed unimportant. The medicinal treatment of the child consisted of sodium bromide and potassium iodide. I have sometimes felt in regard to this case that the subsequent history might perhaps show that it would have been better to have interfered. I have not been able thus far to succeed in tracing the subsequent history of the little patient.

CASE V. *Specimen of cerebral tumor which could have been readily removed by surgical means.*—The brain herewith presented shows a tumor occupying the parietal region and was obtained from a subject in the dissecting-room of the Woman's Medical College of Pennsylvania. The history of the case is, therefore, exceedingly indefinite, though through the courtesy of Dr. George S. Robinson I have been able to obtain the following notes.

The patient was a woman, aged thirty-five years, of intemperate habits, who had, so far as known, no injury of the head and was not discovered to be syphilitic. She was an inmate of a public institution and was sent to its infirmary about a week before her death, complaining of pain in the head which seemed to be somewhat relieved by pills of an anti-neuralgic character. The headaches continued, however, notwithstanding medication, and for about two days vomiting occurred. The patient then became comatose and paralysis of the right arm and leg supervened. The pupils were somewhat dilated and did not respond to light. Respiration was slow and the face flushed. No convulsions occurred, but there were slight twitching of the facial muscles. The patient was not noticed to be blind or deaf. Death took place on the sixth day after admission to the infirmary.

An examination of the specimen shows a flat, circular tumor in the right parietal region lying between the dura mater and the cerebral hemisphere. The convolutions are pushed downward by the growth, but are not infiltrated in the least degree. The dura has not been preserved, but it is quite evident that the growth was attached to the

inner surface of the dura, since its upper surface is torn and it has no attachments to the convolutions, but can be lifted out of its bed without disturbing their integrity. The tumor is almost circular when inspected from above, being 6 centimetres in the antero-posterior diameter, and 6.5 centimetres in the transverse diameter. It is flat from above downward, varying from 2 to 3 centimetres in thickness. It occupies the right parietal region upon the superior aspect of the cerebrum. Its anterior margin lies in a line with the calloso-marginal fissure, and pushes forward the ascending parietal, or posterior central, convolution. The tumor extends backward to the parieto-occipital fissure crowding downward and backward the first occipital convolution. It extends outward and downward to the posterior end of the parallel fissure, or the first temporo-sphenoidal fissure, pressing upon the angular gyrus. The first and second parietal convolutions are flattened and lie underneath the tumor in the

FIG. 3.

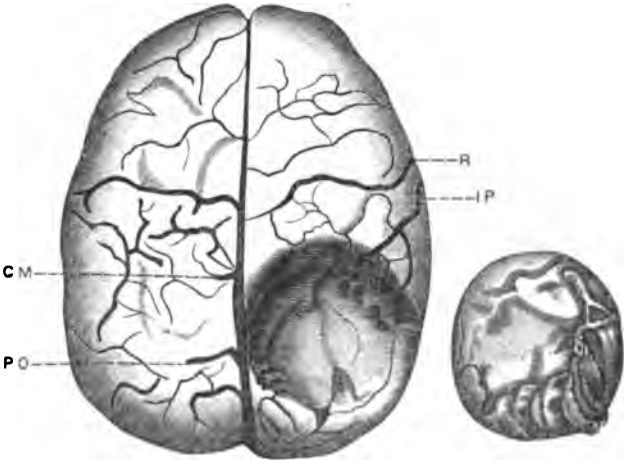


Diagram showing relations of brain tumor. R, fissure of Rolando; I P, inter-parietal fissure; P O, parieto-occipital fissure; C M, calloso-marginal fissure. The tumor has been lifted out of its bed.

concavity made by its growth producing pressure downward. On the inner aspect of the hemisphere the tumor presses the convolutions downward, being nearly 2 centimetres thick where it lay in contact with the falx. The anterior edge of the tumor is about 1 centimetre further forward than the posterior edge of the corpus callosum. The

gyrus fornicatus and the precuneus are pressed downward, but the cuneus does not appear to be pressed upon or displaced.

No surgeon can look upon this specimen without a feeling of regret that he could not have had an opportunity to attempt its removal. Its location immediately under the dura, its freedom from attachment to the cerebral convolutions, and its moderate size would have made its removal easy. Its location behind the motor area is probably the reason that the patient's symptoms were not marked until just before the fatal termination of the disease. Her habits of life and surroundings were such that she would not be likely to call a physician's close attention to the early manifestations of cerebral disorder, if indeed these were apparent to the patient herself. A large opening made with trephine, gouge, or saw, followed by a similar incision of the dura, would have enabled the operator to lift the tumor from its bed without hemorrhage or disturbance of the cerebral convolutions. The growth is probably a fibroma.

The occurrence of right-sided paralysis seems rather curious, but Dr. Robinson states that he is sure of the correctness of this note, for he remembers that she used her left hand during her final illness. There is no evidence of a second tumor on the left side. Possibly the growth may have so pressed against the falx as to have impeded the current in the superior longitudinal sinus, and thus have given rise to pressure on the left cortical centres near the upper end of the fissure of Rolando. Unfortunately, I did not see the specimen until after the dura and falx had been removed.

CASE VI. *Probable basal cerebral tumor, in which operation was deemed inadvisable.*—In September, 1889, a man, aged thirty-four, was referred to me by Dr. H. C. Bloom, who had reached the conclusion that his patient was probably suffering with brain tumor. The history was somewhat difficult to obtain from the patient, who had evidently some impairment of mental faculties. In childhood he had had otorrhœa in each side, and thought that his present ailments, of two or three years' duration, had succeeded a renewed discharge from the left ear. About a year before I saw him he had fallen insensible; but for a year and a half previously he had had attacks of severe pain in the head, to the left of the median line. Some failure of vision had been observed for eighteen months; occasionally he walks unsteadily, but there is no apparent loss of power in arms or legs. His family thought his mental traits had shown change for several years. He is now becoming fat, sleeps a good deal, and is somewhat "weakminded" in his conversation and facial expression. There was no direct history of syphilis. Optic atrophy was found in both eyes; being more marked in the left, with which he could only see enough to count figures. The vision of the left eye was $\frac{4}{LX}$. Examination showed

him to have lateral homonymous hemianopsia and Wernicke's pupillary reaction. The fields of vision indicated a left-sided lesion. No deviation of the eyes was determined, but he thinks he has at times had double vision. Both tympanic membranes were perforated. He had had no epileptic seizures, but, as above stated, had once fallen unconscious. The urine had a specific gravity of 1010 and contained neither albumin nor sugar. The grasp of the right hand was stronger than the left, accountable perhaps to his profession —that of a dentist. Thermometric examination for several days showed him to be free from fever.

No anæsthesia nor paresis could be determined. Dr. B. Alexander Randall's examination resulted in finding in the left ear an old cicatricial condition, with a mere trace of discharge. The original trouble had probably been present in childhood, and was now in abeyance; though occasional exacerbations had in all probability occurred. The right ear was in a state of chronic suppuration of the attic and adjacent cavities, with some likelihood of the existence of diseased bone. No involvement of receptive or central auditory apparatus was discovered by the use of tuning forks. The patient's symptoms were thoroughly studied for me by Drs. Charles K. Mills, H. C. Wood, Edward Jackson, B. A. Randall, and A. W. MacCoy.

FIG. 4.

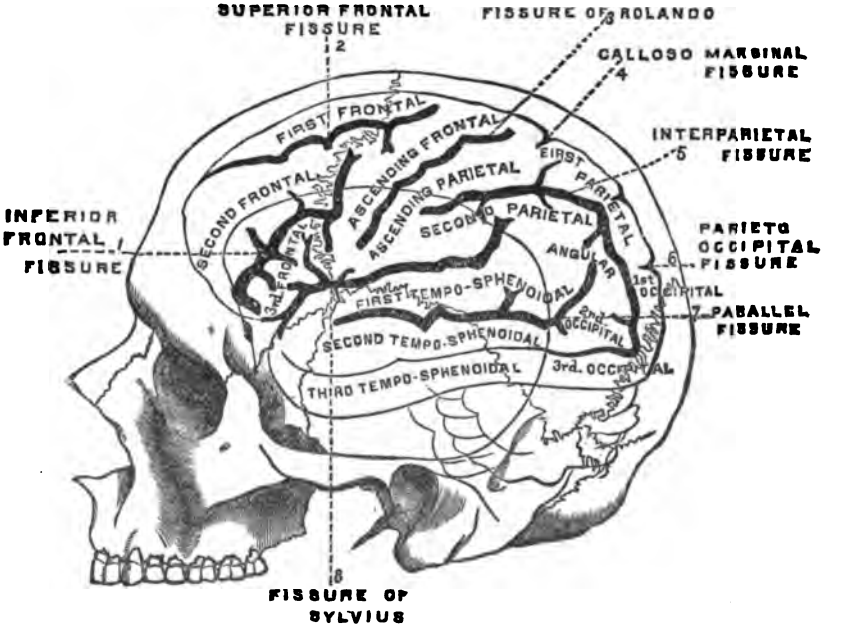


Diagram showing lateral view of the cerebral convolutions and fissures.

From Dr. William Osler, who had seen the man some months before, I learned that then he had had an intense optic neuritis, but at that time no

hemianopsia. Dr. Osler suspected a slowly growing neoplasm; probably located in an anterior location becuse of the early alteration in habits.

Dr. Mills was inclined to think that the symptoms shown when the patient came under my care pointed to a lesion between the optic chiasm and the primary optic centres. This he considered might be a tumor or abscess of the inner part of the temporal lobe, encroaching on the optic tract back of the chiasm; or a similar lesion of the cerebellum advancing and invading the more anterior structures.

Dr. Wood believed the localizing symptoms pointed to a lesion encroaching upon the corpora quadrigemina or optic chiasm, which was most probably either a localized meningeal inflammation with much exudation, due to diseased bone at the base of the skull, or a tumor there situated. He thought it possible that an abscess might exist in the temporal or frontal lobe, but there was little evidence to indicate this being a probability.

This case was one that offered a good many points of surgical interest; but, after determining that the lesion was probably basal and on the left side, I declined to operate, because there was no evidence of the left ear being a probable cause of intra-cranial suppuration. If the symptoms had pointed to a right-sided lesion, the condition of the right ear would have influenced me strongly toward operative measures, looking to the evacuation of a temporal abscess. The association of chronic aural suppuration with cerebral abscess is so well known that I think I should have strongly inclined to exploratory trephining.

I accordingly declined to operate, and sent the patient home. I heard from him frequently, but he gradually lost vision and mental power. I had obtained permission and arranged for an autopsy; but when he died the past summer no word was sent me. Previously to death he had violent pain in the head, a prolonged chill, several successive convulsions and coma with high temperature. These symptoms occurred suddenly and terminated fatally in four days. Before that time he thought his eyesight, which had been almost totaly lost, was improving. The time he survived after my examination, nearly two years, leads me to believe that our abstinence from operation was correct; since the lesion was more probably a tumor than an abscess. If a tumor, its removal was certainly impossible.

This case presents a picture different from the specimen before you, in which the tumor could have been lifted out so readily. I show a diagram of the cerebral convolutions which may aid in following the description of these two cases of cerebral tumor.

I fully recognize that the record of these few cases has not been one of brilliant results. The death of some of the patients, and the short time between operation and this report in others, make the communication in some respects unsatisfactory. It has seemed to me, however, that there are elements of interest in the histories which will afford food for thought and open the way to discussion. It is for these reasons that I have been tempted to give these clinical histories which are certainly not in any way remarkable.

DISCUSSION.

DR. M. PRICE: I should like to ask a question, and that is in regard to the propriety of removing a clot in a case where the operation has been delayed for some time, and where, after trephining, it is found that the clot has become adherent, and where the attempt at its removal is followed by free bleeding. This question presented itself in the case of a young man injured in an iron-works in Phœnixville, some two weeks ago. A small stove-shovel was thrown at him, the handle striking and penetrating the skull. For the first day or two there were no symptoms of paralysis. Dr. Shoemaker was called to the case a week or so after the accident, and at once decided on operation, at which I assisted him. There was incomplete paralysis of the right side, and there had been some slight convulsive attacks. The trephine opening overlapped the clot and the depressed fragment of bone. As I have said, the clot was adherent, and the attempt at removal caused free bleeding. We allowed it to remain, thinking that this would do less harm than the violence necessary to remove it. So far, the result shows that we acted rightly, but what the final result will be I cannot say.

Some of you may recall two murder cases which occurred in 1873. They were both cases of penetrating wounds of the skull through the eyeball, produced by umbrellas. One was a man who, after the injury, came to the Fifth Street dispensary, where I examined him. He then went to his home in Camden, where he died in a few days. The second case was that of a drunken woman, whom I saw four hours later. She was wounded by her husband in his attempt to ward off her blows. She was removed to the Pennsylvania Hospital, where she died.

DR. T. S. K. MORTON: I did not understand Dr. Laplace to state that any provision for drainage was made at the time of the first operation. That might possibly have warded off some of the consequences of the injury.

I should like to ask those present their views and experiences as to the results of operations for epilepsy. It has been my fortune to see a good many cases of epilepsy operated upon, not only where the malady originated in the brain, but in other ways, as from phimosis, contracted tendons, neuralgic testicle, etc., and in none of these cases, if my memory serves me right, has there been a permanent cure. In one case, where a contracted tendo Achillis was divided, the seizures remained absent for two years and then returned. It has seemed to me that possibly the profound anæsthesia has something to do with preventing the recurrence of the attacks.

I had one case of what was considered traumatic epilepsy referred to me by Dr. Mills, that of a child two years of age, who had fallen, striking its head on a piece of iron. Before the accident there had been no epileptic seizures; after the injury seizures soon began, and recurred with great frequency. A thousand convulsions were counted in a short time. These involved one side of the body, apparently beginning in the centres for the thumb, finger, and arm; extending down the right side; and subsequently becoming general. It was decided to apply a large trephine over the arm centre and see what was there. An inch and a half button was taken out. The dura was thickened, and I dissected it entirely away, leaving a margin of an eighth of an inch all around the trephine opening, so that hemorrhage

could be readily controlled. There being no apparent lesion of the brain, the œdematous pia mater was not opened. The button of bone was not replaced. The flaps were sutured, and catgut drain introduced. The drain was removed ten hours after the operation, when the dressings were found saturated with serum. The wound healed by primary union, and the child went home into the country on the tenth day. I understand that there has been no material improvement in his condition.

DR. CHARLES K. MILLS: I can recall ten or twelve of my own cases of epilepsy in which I have had operations performed, and I have been present at fifteen or twenty other operations, so that I have a personal experience of some twenty-five or thirty cases of operation for epilepsy. I have also paid a good deal of attention to the theoretical part of the subject. I am sorry to say that the results in the majority of cases have not been permanently good, but I do not feel altogether discouraged in regard to cranial and cerebral operations for cases of this character. There are reasons why these operations have not succeeded. Some are inherent to the condition, while others are dependent upon errors of diagnosis, while still others are dependent upon the fact that the convulsive habit has been induced by the long continuance of the condition.

I have had two cases of cortical excision. One of these will be reported by Dr. Keen in the coming number of the *American Journal of the Medical Sciences*. In this case a small tumor was found in the centre of the trephine opening, which proved to be a sarcoma. A part of the cortex an inch in diameter was also removed. Although the patient improved after the operation, she is now practically no better than before the operation. It seems to me that in this case the brain and nervous system had been so influenced by the long-continued convulsions that they could not recover. The great difficulty in many of these cases is the late period at which the operation is performed. In nearly all cases of epilepsy, except those due to recent traumatism, the affection has existed for some time. And then there are secondary changes which cannot be removed by trephining.

I think that of all cases certain classes of hemorrhage present the greatest likelihood of benefit from operation. These are certain supra-dural and sub-dural hemorrhages which can be pretty well localized. In the case of Dr. Price, I think that it would have been better to remove the clot as a whole, not perhaps by traction, but by a second trephine opening. In some cases these dural and sub-dural hemorrhages do lead to permanent epilepsy, even though at first no symptoms are present.

I believe that the most brilliant results, although we have not had them yet, will be in cases of brain tumor. In this class of cases fibromata offer more chance than other forms of growths, for usually they do not permeate the brain. Some old syphilitic tumors, and a few of other varieties, can be removed. The difficulty in these tumor cases is that they have been left too long.

DR. JAMES HENDRIE LLOYD: The cause of the paralysis of the arm on the same side as the tumor in this case seems obscure, but I inferred from what Dr. Roberts said, that he was not himself certain of the accuracy of this observation. I can hardly see how that tumor could cause hemiplegia of the same side unless it acted as a cerebellar tumor sometimes acts—by downward pressure. In some tumors of the cerebellum there is hemiplegia

on the same side from pressure downward on the motor tracts below their decussation. In this case the tentorium would probably prevent such downward pressure, and I hardly see how the alleged fact could be explained in this way. The brain has not been thoroughly dissected, and there may be some other lesion, as hemorrhage or a secondary growth, which has caused this symptom.

DR. ROBERTS: I was much interested in Dr. Laplace's case, but I do not quite understand the condition of affairs. I understood that the temperature, which had been high, had descended to about normal before the operation. I should like to know what was the character of the clot some two weeks after the accident. Was it broken down or partially organized? It seems to me that it would be difficult to get away an old clot of blood which would be fibrinous from such an irregular surface as the base of the skull. I could not help thinking that possibly the clot removed was one due to the manipulations at the base of the brain. Again, was the discharge from the wound serum from blood-clot, or was it cerebro-spinal fluid mixed with a certain amount of inflammatory exudate? While the result has been exceedingly brilliant, I could not help thinking that perhaps if no operation had been done the patient might still have recovered. As the history, as I remember it, seemed to indicate beginning improvement, was it absolutely necessary to keep the wound open for a number of days? I can understand that drainage is necessary in recent brain injuries, but in this case the drain was used at a late period and kept up for some time. The case is one of extraordinary interest, and I simply wish to have these points brought out clearly, as I failed to grasp the points when the report was read. No unjust criticism is intended, but I wish to study the case.

It seemed curious that in my specimen of brain tumor there should be right-sided hemiplegia, but I think that there is little question that it was on the right side. I inquired in regard to the eyesight, and as far as known there was no blindness or deafness. Very few symptoms were noted, as the patient was in a public institution and made no complaint until a few days before her death. I would have been interested to hear in regard to the probability of the paralysis being due to pressure upon the longitudinal sinus damming back the blood and making secondary pressure, as it were, on the opposite side.

DR. LAPLACE: I would state in reply to Dr. Morton's question, that at the first dressing I put in an iodoform drain, which remained in until the time of the operation.

In regard to the points suggested by Dr. Roberts, I would say that I was well aware that on the thirteenth day the clot would not be in the condition that it was on the second day. I knew that it would be fibrinous, and in order to entangle it I devised the little instrument shown.

A few hours after the accident the temperature rose to 104°, and then for the next ten or twelve days varied between 100° and 103°. The coma then began to increase. Because the temperature before the operation was low, it did not follow that the patient was getting well. The patient was really worse. He was more comatose and he could not swallow. He had to be nourished by the bowel. Something had to be done, or he would die. I relieved the intra-cranial tension and provided for drainage. There must be drainage in cerebral surgery on account of the unyielding nature of the cranial wall.

MODIFIED JUNKER INHALER, WITH POINTS FOR DISCUSSION ON ETHER AND CHLOROFORM NARCOSIS.

By MARIE B. WERNER, M.D.

[Read November 25, 1891.]

My object in presenting this inhaler before the Society to-night is not alone because I consider it the best of its kind ever brought to my notice, and therefore concluded it might be of interest to some of the members here to-night, but also to learn something about the pros and cons regarding the use of ether and chloroform as anæsthetics.

This inhaler has the respiration indicator approved of by the Hyderabad Chloroform Commission, and in addition has a graduated stopcock which will, if properly adjusted, control the volume of air forced through the bottle containing the anæsthetic, thus giving a continuous current.

The bottle should be but partially filled—4 to 7 drachms—thus allowing the contents to pass over through the tube to the face-piece in the form of vapor. If chloroform is used, with one compression of the bulb 5.19 cubic inches of air are forced through the liquid, and will evaporate, in a temperature of 68° F., about one minim; a trifle more than one cubic inch of the vapor passes through the short tube into the face-piece.

The noteworthy points are that the patient does not inspire much, if any, of the expired air; the apparatus is clean and can be kept so with little trouble; the quantity of the anæsthetic used is comparatively small; and last, but not least perhaps, the character of the respiration is always indicated to the operator as well as the anæsthetizer.

The character of the respiration seems to be of vast importance if we accept the report of the Hyderabad Commission, based upon an almost unbroken series of 45,000 cases of chloroform administrations extending over forty years, in which the anæsthetizers were guided entirely by the respiration, and there was not a death. In strict accord-

ance with these clinical facts the experimental data of the Hyderabad Commission prove—[1]

"1. That the administration of chloroform is free from risk if the breathing is perfectly regular throughout and the inhalation is stopped as soon as the animal is fully under its influence.

"2. That chloroform never causes death by sudden stoppage of the heart.

"3. That death from chloroform is always the result of an overdose.

"4. That the danger of overdosing is enormously increased by holding the breath, struggling, asphyxia, or anything which causes the patient or animal to take gasping inspirations.

"5. That the inhibitory action of the vagus nerve, which is called into play in threatened and actual poisoning with chloroform, is a safeguard."

I do not wish to give the impression that I advocate chloroform in all cases, but think many will admit that there are cases where it has advantages over ether, provided it can be given with safety to the patient. For instance, in cases of bronchorrhœa it is less stimulating to the mucous membrane; in certain pathological conditions of the kidneys it can be relied on with greater safety. Last and perhaps not least to be considered is the small quantity necessary for a large operation, thereby possibly obviating some of the unpleasant after-effects of ether, notably the nausea, vomiting, and depression which sometimes follow a prolonged operation.

There is one point I have not yet been able to develop, and that is the utility of this apparatus in giving ether. Although I have been assured it would behave satisfactorily, I have not had sufficient opportunities to demonstrate it with any degree of certainty to myself; but feel sure, however, if it could be utilized it would mean economy of ether and greater comfort to the patient.

This inhaler may be obtained from Messrs. Krohne & Senseman, London.

DISCUSSION.

DR. JOSEPH HOFFMAN: I have used this instrument quite a great deal, and its utility for chloroform inhalation is unquestioned. The quantity of chloroform required is much diminished by its use; for an extended abdominal operation I have more than once had a drachm of chloroform suffice. Nor have I seen any bad effects from chloroform when this instrument was used, although I do not believe that the bad effects are completely obviated. In

[1] Lancet, November 29, 1890

two or three cases I have found that ether had to be abandoned and chloroform substituted.

So far as the report of the Hyderabad Commission is concerned, I do not think that in this country it will be accepted as final. The results of experiments on animals are not always applicable to man. In the sudden deaths in man, fatal result is brought about by action of the anæsthetic on the heart, and not on the respiratory apparatus. Chloroform paralyzes reflex action, while ether stimulates it. In children there is little danger from chloroform, and in children too the reflexes are stronger than in adults.

So far as the application of this apparatus to the administration of ether is concerned, I do not think that it will work, as it is not possible to obtain a dense vapor of ether in sufficient quantity. If the apparatus were modified so that a larger quantity of vapor might be produced, the effect might be better. Finally, it is to be insisted, that to obtain good results and to escape the dangers of anæsthesia, we must depend rather on the anæsthetizer than on any apparatus he uses.

DR. JAMES COLLINS: I recall very well the time when we had no ether. It was chloroform. Chloroform was found in all the medical chests and was given with impunity. We never thought of danger, provided the man was sufficiently recovered from shock. I saw only one accident from chloroform, and that was after the battle of the Wilderness. We had been giving chloroform all day, when a man came in with a wound of the hand; he took a few whiffs, and expired. In his case the rule had not been observed—that is, not to give the anæsthetic when the man was under the influence of shock. The shock from gunshot wounds often acted strangely. Men with severe wounds would walk long distances to the hospital with no signs of shock, and yet, when placed in bed, would in a few minutes present marked evidences of shock. It was with some regret that I saw the reaction against chloroform that came later. Chloroform is certainly more pleasant than ether, and I think that if properly given it is as safe as ether. I have seen death from ether. It was a case of pistol-shot wound; ether was given and the shock came on while the man was under the influence of the anæsthetic, and he died. Many years ago, at the University, we gave a mixture of ether and chloroform. From that, I saw no accidents.

DR. JOSEPH LEIDY: The only death that I have seen from an anæsthetic occurred while chloroform was being administered with this apparatus. The chloroform was administered by a gentleman who had been in the habit of using this instrument almost daily for months. I think, however, the death would have occurred whether the instrument had been used or not.

DR. JOHN B. ROBERTS: I have seen six deaths attributed, and probably justly, to anæsthetics. Fortunately, in none of these was I the administrator of the anæsthetic. I never have a patient etherized without feeling a great deal of discomfort, especially if the ether is given by the ordinary individual that administers ether. The majority of them do not know how to give ether unless they have seen a death, or nearly killed someone by ether. If ether or chloroform is given 100,000 times without a death, it is no proof that there is no danger in the administration of ether or chloroform. Although the Hyderabad Commission decided that chloroform is better than ether, yet I think that Dr. Wood echoes the sentiment of this portion of the country at least, when he says that ether is the safer.

It seems to me that the difficulty is that the anæsthetic is placed in the hands of incompetent people, who do not know how to give it and do not pay attention to their work. In several of the cases of death from anæsthesia which I have seen, I believe that the result was due to the carelessness of the administrator. A short time ago I saw a patient nearly die from ether, and he was only kept alive by about an hour and a quarter's artificial respiration. The trouble is this instance was due to the fact that I, the operator, called the attention of the anæsthetizer from his work. I have scarcely used chloroform, and have seen very little of its use, but if the evidence of literature is worth anything, it is in favor of ether. I do not believe that it is the shock of injury; I believe that it is the chloroform that kills. Chloroform is certainly the more powerful and more dangerous agent. In spite of the objections to ether, it seems to me that the opinion of the Philadelphia profession in favor of ether is correct, and is borne out by the literary evidence.

DR. T. S. K. MORTON: I have had an opportunity of examining this apparatus, and so far as apparatus goes, it seems superior to any that I have seen. But I do not see that any method for administering chloroform can be better than the little wire frame, invented, I think, by Esmarch. So far as ether is concerned, I dispense with all apparatus; especially do I dislike the Clover apparatus, where the patient respires the same air over and over. In most cases ether is given badly. Just as I have learned to give ether in less condensed form, so have my results been more satisfactory. The cone, as usually employed, is extremely objectionable; and towels as found at patients' houses are usually impregnated with starch and will not absorb the ether or allow air to pass freely through. Unless you obtain very old towels or napkins, it is either difficult to etherize the patient, or you have to give the ether in too concentrated form. Some two or three years ago it struck me that it would be well to use cheese-cloth for this purpose, and since then I have used nothing else. I use small squares, about six by seven inches, consisting of ten or twelve thicknesses of the gauze. This is placed over the patient's face and the centre raised up by puckering the lateral edges. This offers no obstruction to the passage of air. The ether is dropped upon the centre of the gauze from above. I have thus kept a child under the influence of the anæsthetic for ten minutes, with but one drachm of ether.

DR. WERNER: In presenting this apparatus, I did not wish to be understood as advocating the general use of chloroform. It seems that there are some cases in which it can be used with better advantage than ether, and, therefore, it is well to know the best method of administering it. I think that the trial alluded to by Dr. Hoffman with this apparatus for ether was not a fair test. The patient was difficult to etherize at best, and, seeing that, I used the towel. I had occasion to try it again for a smaller operation, and it answered admirably. In answer to Dr. Morton's remark about the unequal supply of vapor and air, I would like to call attention to the fact that this stopcock, if adjusted properly, will give a continuous current of air. I think Dr. Morton's plan of giving ether better than the towel. I heartily indorse Dr. Roberts's statement that there is often not sufficient care and attention given by the anæsthetizer to the work in question, and feel certain the operator can work with greater freedom when the mind is at rest in that direction. I think there is room for improvement in the methods of administering both ether and chloroform.

THE MEDICAL TREATMENT OF APPENDICITIS, WITH A REPORT OF FIVE CASES ENDING IN RECOVERY.

By A. B. KIRKPATRICK, M.D.

[Read December 9, 1891.]

The diagnosis, symptomatology, and pathology of diseases in the region of the cæcum have been so recently and ably given by Drs. Price and Morton, members of the Society, that it would be useless for me to go over the ground again and attempt to add anything new on the subject. Surgery has made such marvellous advancement and accomplished such brilliant results in the last decade, that the medical treatment of certain diseases appears, at least for the time being, to be eclipsed. I am led to believe, from my limited experience, that some of our younger surgeons are too ready to perform abdominal section before they have exhausted the medical armamentarium, which, though perhaps somewhat slower, *may* be surer and subject the patient to less risk.

I think the surgeon in consultation with the physician will be able to determine and select the cases for operation, if they are so fortunate as to see them in their incipiency, but in many of these cases the physician is called in late, and the surgeon later—too late in some cases.

We are all more or less infatuated with the wonderful results of present surgery, because, I think, it is something tangible. We make our diagnosis of appendicitis, open the abdomen, and remove the diseased organ. There is the ocular proof of our skill in diagnosis and operation. In medical treatment our evidence, if we can produce any, is not so conclusive. It is of a more circumstantial character.

No one of the same experience feels more deeply than I do, the debt of gratitude we owe to aggressive surgeons, and no one, I think, takes the knife with more satisfaction, but I must always be *certain* that it is the *only* or safest method for the patient.

In the five cases that I wish to report, I demonstrated within twenty-four hours—in four of them at least—that an operation was not necessary, and all the five recovered without section. You may infer that they were all mild or benign. Three of them were, because seen early and treated vigorously.

Perhaps the title of my paper is not broad enough to cover it, but I wish to include in the medical treatment of typhlitis everything short of surgical operations, for I rely as much, or more, on mechanical measures as on internal medication. I wish to report what I consider as the most critical case first, though it was my third in regard to date. The first case dates from March, 1889.

In four of the cases other physicians had been in attendance, or saw the patient with me in consultation. Two of the cases came to my notice late in the disease, and to make the history complete, I shall be obliged to read parts of several letters which were kindly written to me by the physicians who first had the cases in charge.

For the previous history of the first case, I am indebted to the kindness of Dr. Edwin B. Wheeler, who wrote me the following letter two months after treating the case:

"Was called to see Master A., thirteen years old, Thursday, April 2, 1890. He had been constipated a day or two, evidence conflicting as to the condition of the bowels previous to that time. There had been no diarrhœa, however. I first thought it a case of typhoid fever, as the father had just recovered from that disease. I ordered a powder of calomel, but no action. Then gave one bottle of citrate of magnesia in half-bottle doses, with no result. The pain and tenderness in inguinal region increasing. Some tympanites. Gave injection of tepid, soapy water with a few drops of turpentine without any result. On Friday I gave drachm doses of Rochelle salts in one-third of a glass of water every hour for four doses, and tincture of hyoscyamus. There was no result so far as any action of the bowels was concerned. The vomiting was increasing, and the tenderness covering a larger area. During this time it had become apparent that we had to deal with an obstructed bowel, due either to intussusception, typhlitis, or perityphlitis.

"Injections on Saturday morning were not retained. Passes up a catheter, but still injection was not retained. Gave morphine in small doses. Saturday, P.M., Dr. J. H. Dripps saw the case with me. We agreed as to the case, but were both on the fence as to the advisability of section. We then called in Dr. Noble, of the Kensington Hospital, Saturday, 6 P.M. After talking over the case we concluded that the boy's best chance was to have the belly opened and the obstruction removed. We ordered a room cleaned and agreed to see the case the next day.

"At 9 A.M., Sunday, April 6th, we (Drs. Dripps, Noble, and myself) met and concluded that the boy's chance would be slight if we operated in such unsanitary quarters, with such nursing as the father and mother could give.

The parents agreeing, we wrote to the Pennsylvania Hospital, asking them to take the case, the father to let me know the result of his errand. We separated with the understanding that if the hospital refused to admit him, we would operate, Dr. Noble saying he would hold himself in readiness until 2 P.M.

"About 11 A.M. the father informed me that the hospital authorities would send for the case as soon as I desired. I sent him back to the hospital with word to send for the case immediately. Somewhere about 3 P. M. the father informed me that he had been down-town, but did not go to the hospital. He had stopped to see the boy's aunt, who said he should not go to the hospital. Whereupon I dismissed the case, refusing to have anything further to do with it. The case has certainly resulted very fortunately in your hands, and I am truly pleased, etc."

I will not go fully into the diagnosis of this case, for I was perfectly satisfied when I learned from the families, what doctors had consulted in the case.

I was called in to the case at 10 P. M., Sunday, April 6th. The symptoms all indicated complete obstruction of the bowel, and collapse. He had vomited first on Wednesday. The temperature was 96½°; pulse indistinct at wrist; heart was 140 per minute, and he was in a cold perspiration; respiration 40. Abdomen exceedingly tympanic, and bladder much distended. There was stercoraceous vomiting, and nothing had been kept on the stomach for days. I at once gave a hypodermic of morphine, atropine, and strychnine, and then emptied the bladder by a catheter, and about sixteen ounces of water passed. The patient was apparently moribund, but revived somewhat after the hypodermic injection, and though I feared he would die while giving it, but I knew there was nothing to lose, and thought there might be a slight chance for life if the obstruction could be removed, so I had him supported in the knee-chest position, and injected a pint of warm liquid containing castor oil, turpentine, whiskey, and Epsom salts. This was about 11 P. M.

This was kept in the bowel for half an hour by a compress, held in position by the hand, then he was allowed to lie down on the right side. Within an hour there was copious evacuation of liquid with scybalous masses. The injection was repeated at 12 o'clock, and another free movement resulted. These greatly relieved the tympany and pain. We then began to give turpentine and whiskey by the mouth once in two hours, and also a drachm of Epsom salts in hot water once in two hours alternately. Only the first dose of salts was rejected. The whiskey and turpentine were retained. These were regularly administered through the night. I left the patient at 1 A.M. asleep, and he had become much more comfortable.

On returning in the morning, I found there had been several more movements, and the bladder had been emptied naturally. The tumor in or over the right iliac fossa had nearly disappeared, and the pain and tenderness were much less. The temperature was normal. The tongue and sordes on teeth indicated typhoid fever. There were five movements of the bowels within twenty-four hours after the enema, and not less than three to six any day after for two weeks. The temperature gradually rose to 102°, and the evening

temperature was about that for a week, when it gradually declined, but did not become normal till the 29th, or three weeks from the time I first saw the case. The stools had quite the appearance of typhoid, as did the tongue, and there was a suspicious eruption on the chest and abdomen. After the obstruction was removed the case was treated as a simple case of typhoid fever. He had two grains of quinine and one-thirtieth of a grain of strychnine three times a day, with nitro-muriatic acid, pepsin, and bismuth every four hours, and paregoric when needed to control the bowels, and a liquid diet throughout.

At noon, the fourteenth day after I first saw him, after some pain and flatus, he passed a slough from the bowel, which, in the recent state, was elliptical and two and a half inches the long diameter. There seemed to be some pain and tendency to collapse, so he got another hypodermic and free stimulation. There was also a rise of 2° in temperature. He rallied the next day, and made a rapid and complete recovery.

On May 6th, which was just a month from the time I first saw him, he sat up and took solid food.

He is a strong, healthy boy, and now drives for me.

I watched the case very closely throughout and feel certain that the intussusception, or typhlitis, or perityphlitis, was followed by a clear case of typhoid fever. I am by no means so clear in regard to the pathological condition in the region of the cæcum and shall greatly appreciate the views of the members of the Society on that point.

The second case, Mr. M. K., who is a prominent and very active literary man in this city, dates from March 24, 1889.

The patient gave me a very intelligent history of his case, which was that there had been a gradual decrease in the evacuations for several weeks, with a great deal of distention and discomfort of abdomen, and finally obstinate constipation followed. When I first saw him there had been no movement for several days.

He had a tumor and localized pain in the right iliac fossa. Temperature 103½°. Pulse 120. Coated tongue, etc.

He was given a hypodermic of morphine and atropine for the pain, which gradually spread over the abdomen as the gas accumulated. Two large doses of castor oil and turpentine were taken without any action. He took calomel, soda, and ipecac powders for twelve hours, followed by Hunyadi water, but still there was no movement of the bowels. We then resorted to the enemata of turpentine, laudanum, castor oil, Epsom salts, and hot water, given in the knee-chest position. These moved the bowels freely and relieved the pain and distention. Turpentine stupes were also used freely.

There was a double inguinal hernia in this case and to satisfy ourselves that there was no strangulation of the gut Dr. W. W. Keen was called in consultation, and pronounced the case free from any such complication and confirmed the diagnosis of appendicitis. He suggested pills of colocynth comp. and opium.

The patient made a good recovery and for several weeks took pills of aloin, strychnine, belladonna, cascara, and physostigma to relieve the atonic condition of the bowel, and an occasional dose of Hunyadi as he was rather stout and full-blooded.

In July, or four months later, this same patient had a recurrence of the trouble while at the seashore, which began, possibly, with a slight tendency to constipation early, but the first the patient complained of was a severe serous diarrhœa with high temperature—104°. Pulse 128 (normal 58). Severe pain in the ileo-cæcal region. This attack began before I took up my summer practice at Cape May Point and Dr. F. E. Stewart, of Wilmington, was called in.

He made the diagnosis of colliquative diarrhœa, and gave acetate of copper and morphine to check it, and aconite for the fever, but nothing seemed to have any permanent control over the bowels.

Right here in this case, which was my first patient, but his second attack of appendicitis, I learned a very valuable lesson. Here was an obstructed bowel, and nature was trying, by pouring out a very excessive liquid secretion, to flush out the obstruction or foreign matter.

I simply took the cue from nature, and with small, frequently repeated doses of calomel, ipecac, and soda, followed by salines, accomplished the object, and in less than six hours had the satisfaction of seeing the tumor, which had been in the region of the cæcum, deposited in a commode, which the black, very offensive mass nearly filled. In this attack we used hypodermic injections of morphine for pain, and pilocarpine for the high fever and dry skin and tendency to cerebral congestion, as the kidneys were not acting at all freely. There was no vomiting after the first hypodermic, and the patient began at once to take iced champagne and Apollinaris, and soon was able to take milk and other liquid food.

In this case no resort was had to rectal enemata, as the bowels were thoroughly cleared out within six hours after the time I first saw the patient, and in three or four days he was attending to his regular business. He took the aperient, tonic pills for several months, and was requested to use Hunyadi water freely, and rectal injections, if the symptoms occurred again. He has had no recurrent attacks and no constipation since.

The fourth case, Miss S., occurred at Cape May Point, and was first seen and treated by Dr. F. E. Stewart, Wednesday, August 25, 1891. I wished to speak of this case at the special meeting, September 28th, when Dr. Morton read his interesting paper on "The Surgical Treatment of Appendicitis," and wired Dr. Stewart for his

diagnosis, and he sent me the following telegram: "Case was obscure. Called Dr. David Stewart in consultation. He said 'appendicitis.'" I am indebted to Dr. F. E. Stewart for kindly furnishing me the history of this case, which I quote from his letter:

"In the case of Miss S., there were pain and tenderness over the abdomen, which, as the case developed, became marked in or over the right iliac fossa. Instead of dorsal decubitus, the patient sat in a chair with her thighs flexed on the abdomen, and could not lie down until relieved by treatment. There was fever; temperature 102°. There was constipation, nausea, and if I remember correctly, some vomiting, but the latter was not a marked symptom of the case. I did not discover a tumor on abdominal palpation or vaginal touch, but Dr. David Stewart, who saw the case with me on the second day, called my attention to what appeared to be a doughy mass on the right side of the body on examination *per rectum*. I must confess that I would not have discovered said mass except my attention had been called particularly to it, or, in other words, I might have had a suspicion of its existence, but it required a finger of more education than mine in feeling for tumors of this nature to make a positive diagnosis.

"The treatment suggested consisted of hot turpentine stupes, opium, and iodide of mercury; under this she seemed to improve.

"From the beginning I recognized the gravity of the case. I advised her to go to the city at once, as proper nursing was out of the question, situated as she was at the Point. Furthermore, I told her if she got worse an operation might become necessary, and then it would be too late to remove her."

I first saw the case Monday, August 31st, at 6.30 P.M., and found her extremely weak and nervous from the trip from Cape May Point. The temperature was 103½°, pulse 120, abdomen tense, tympanitic, and extremely sensitive. I found a large tumor in the region of the ileo-cæcal valve, intense pain and nausea. There was extreme tenderness over the tumor and abdomen generally, indicating a good deal of general peritonitis.

Miss S. was brought to the city by her sister-in-law, and they went into a house where the furniture had just been piled in. There was not even a bed up or any convenience for heating water, so in regard to nursing and environment she did not improve her condition. When I arrived she was on a bed that had been hastily put up.

The sister-in-law, who acted as nurse, got hot water for stupe and enema, and the patient had the same treatment, practically, as the boy—the first case reported—except that I entrusted the giving of enemata to the nurse, who proved very intelligent and efficient.

When I called next morning I found the bowels had moved freely several times and, though the patient had had a restless night, she had slept some. The pain and distention were nearly gone and the temperature had fallen to 101°. By Wednesday, September 2d, the temperature was normal and the pain was entirely gone. She began sitting up Thursday, without my knowledge, and the next Wednesday she went back to the Point. I believe she had a slight recurrence of the pain, inflammation, and constipation the

week after she got home, but they were controlled by injections, stupes, and opium suppositories.

She has enjoyed good health since.

The other two cases of typhlitis, which occurred in my practice within the last year, were quite similar in regard to symptoms and treatment to the others that I have reported in detail, and as I relied only on myself for the diagnosis and treatment, I will not weary you with a repetition of them. I have not aimed to give the latest and most approved treatment from the text-books of the day, but what seemed to me to be indicated and necessary in the emergencies of these cases, when I dared not waste a moment in temporizing or experimenting. It appears to me a serious loss of time to depend solely on external applications to the abdomen and protiodide of mercury with belladonna and opium internally, when we have to deal with a bowel obstructed by hardened accumulation of feces. I believe most cases of obstruction of the bowel, if not due to intussusception or strangulated hernia, are due to the absence of the natural secretion caused by the localized typhlitis, which, if not soon relieved, becomes a perityphlitis, and then more or less general peritonitis must result. The rational method seems to me to be: First. To relieve the pain by hypodermic injections. Second. To remove the cause or obstruction by causing, if necessary, pathological or excessive secretion, by giving some saline, which I believe is the best antiphlogistic for the inflamed bowel. Third. To soften the hardened fecal accumulation from below with enemata, solution of Epsom salts in water as hot as can be comfortably borne, to which I add turpentine and oil. The knee-chest position, with copious enema, favors the distention of the colon up to the seat of the disease.

I have found by experience that the enema to be effective must be given in this position, and that it must remain in the bowel for some time, and in several of my cases it was necessary to repeat the operation three or four times. This plan of treatment has been successful in six cases, which are all that I have treated; but I fully realize that it may fail in the seventh.

I think it is truly in meetings like this that surgeons are broadened medically and physicians surgically—if I may be allowed the phrase. Doctors are only human, as we hear it said of ministers, and as such they are prone to do what they prefer, whether it be surgical or medical, and naturally they do best what they like to do and do oftenest.

DISCUSSION.

DR. CHARLES P. NOBLE: I arrived a little late, but I understand that reference has been made to a case which I saw in consultation. It was undoubtedly a case of intussusception. The case illustrates the fact that occasionally a patient will recover from this condition by sloughing of the bowel. It also illustrates the difficulties of diagnosis of the cause of peritonitis when the surgeon is called in late. The boy had been sick for nearly a week when I saw him. There was evident obstruction of the bowels, with fecal vomiting, and there was undoubtedly well-marked peritonitis; and the history indicated that the peritonitis had arisen in the right iliac region. The question was whether the case was one of appendicitis, or one of intussusception. The physicians in charge were inclined to regard it as a case of appendicitis, and I agreed with them, as the symptoms of invagination were absent; yet I must say that I felt that intussusception through the anus, but it was so high that my finger barely touched it, and I was not sure that it was not a fold in the bowel.

It is fortunate for that boy that our advice was not followed; for if he had gone to the hospital and been operated on in the condition that he was in, the chances would have been much in favor of a fatal result. At the same time, I think that it would be exceedingly dangerous to argue from such an exceptional case any general rule of practice. The recoveries in this class of cases, where the bowel is allowed to slough away, I think does not exceed two or three per cent.

DR. T. S. K. MORTON: The first case reported is of interest from the fact that it was a well-marked case of intussusception, and yet the classical symptoms of this condition were absent. There was no passage of blood with the stools, and there was absence of rectal irritation. The condition was about as marked as it possibly could be, and yet a diagnosis apparently was not possible.

I think that the position of the surgeon in regard to appendicitis is often misunderstood, especially by the mere medical practitioner. So far as I have seen, the surgeon is not anxious to operate, and the cases not operated on vastly exceed those in which operation is done.

With reference to the constipation of appendicitis, I think that where the bowel cannot be moved by any procedure either from above or below, the case is exceedingly unfavorable for recovery, with or without operation; whereas, if the bowels can be moved, the prognosis becomes much more favorable. If, after the bowels are freely moved, the symptoms subside, I look upon the case as one that will probably not require operation at that time. If, however, there is only temporary amelioration of the symptoms, or none at all, the case is one for operation.

DR. WILLIAM S. STEWART: I am not satisfied that the cases reported should be regarded as true cases of appendicitis. There was evidently impaction of the ascending colon in all five cases, due no doubt to inflammatory action; but it is evident that in these cases operation was not justifiable. First remove the impaction, and then if there is an aggravation of the symp-

toms, the inflammation becoming more marked, it is then time to consider the propriety of surgical treatment.

DR. KIRKPATRICK: I am sorry that no one has attempted to throw light upon the subsequent course of the first case reported, as to whether the typhoid condition which followed was due to the inflammatory trouble or was a true typhoid fever.

I should not like to be considered, in this paper, as not favoring operation in proper cases. The point which I wish to make is, that I fear that in some cases the physician does not take the proper means to remove the obstruction of the bowel before resorting to operation. I fully agree with what has been said as to the unfavorable prognosis of operation in cases where the bowels cannot be moved at all.

I think the criticism of (I believe) Dr. William S. Stewart hardly just or tenable. I understood him to say that he did not believe the cases reported were true cases of appendicitis—only obstruction of the bowel. I took particular care not to report in detail the cases in which I relied upon myself for diagnosis, but based my treatment upon the diagnoses of Drs. Keen, Noble, Wheeler, Dripps, and David Stewart. I think we must admit that they are careful, skilful men, and capable of making a correct diagnosis.

SUPRA-VAGINAL HYSTERECTOMY.

By J. M. BALDY, M.D.,

PROFESSOR OF GYNECOLOGY IN THE PHILADELPHIA POLYCLINIC; SURGEON TO GYNECEAN HOSPITAL; GYNECOLOGIST TO ST. AGNES'S HOSPITAL.

[Read December 9, 1891.]

IT is not the object of this paper to discuss the different methods of surgical treatment for uterine tumors, nor to more than incidentally touch upon their medicinal treatment. My personal practical experience in the surgical direction has been wholly that of supra-vaginal amputation, excepting in those cases of small uterine fibroids where it has been found advisable to remove the appendages only. In this connection I may say that where the opportunity presents to choose between the removal of the appendages and the enlarged uterus itself, I always favor the removal of the diseased uterus, along with the tubes and ovaries. The one and only point which comes into consideration in this decision is whether or not the uterus is large enough to be delivered through the abdominal incision. If it can be delivered, the hysterectomy is always performed. To my mind one of the great advantages gained in hysterectomy, by the extra-peritoneal method, over oöphorectomy, is that no stump or raw surface is left in the peritoneal cavity to become the seat of suppuration, or to whose freshened surface loops of intestine can become adherent. In uncomplicated cases the operation amounts to little more than an exploratory incision, and in my opinion is as safe as an ovariotomy.

I have operated fifteen times for large uterine tumors. In fourteen cases the uterus was removed, but in the remaining case the operation was ended as an exploration. Of the fourteen finished operations, two died.

The patient whose tumor was not removed was a white woman about thirty-five years of age. The growth had existed for more than ten years. When she was first seen she was in bed, where she had been for some weeks, with an attack of abdominal pain. For months she had only been able to

be about at odd times, and considered her life a burden. An operation had been proposed to her a long time before, and its dangers brought vividly before her eyes. She had continued to suffer from pain and hemorrhage, until, in spite of her former fears, she was, at the time I saw her, determined to have the operation performed at all hazards. In spite of her long suffering she was still a strong, hearty-looking woman. The abdomen was opened at the Gynecean Hospital before a number of physicians, and the tumor found to extend above the pelvic brim. The intestines were adherent over it at various points, and had to be torn loose in order that a careful exploration could be made. The growth was found to be in the broad ligament, and was consequently immovable. The only adhesions which existed were the intestinal ones, which had been torn through. The removal of the tumor meant a complete enucleation of a solid growth, with all the chances of death from hemorrhage which such procedures entail. It was determined to end the operation, explain the condition to the woman, and let her decide whether or not she desired to risk its removal at some subsequent time, or preferred a trial at electro-puncture. The result was a complete symptomatic cure. It is now some five or six months since the operation and the woman declares she has never been so well in her life; she attends to all her duties, goes to dances, and in all other ways leads an active life. She declares that the tumor is rapidly decreasing in size, and is most confident that it will disappear altogether. She looked at me most sceptically when I told her it would not go away, and that some day all her old symptoms would come back.

The last time I saw her—a month ago—I was considerably staggered by the fact that there was an undoubted decrease in the size of the enlargement. It is barely possible that it may eventually turn out to be another example of a solid tumor becoming absorbed after an exploration; several such cases have been reported by Tait and others.

One of the points of greatest interest to me in this case is the fact that her relief is not dissimilar to what is claimed for the electrical treatment. Had she gone to Dr. Massey for that treatment, as I advised her to do, and which she would have done had she not gotten well so rapidly, electricity would have obtained the credit for the cure. As it is, the lesson taught should not be lost. Is it not possible that the great relief apparently obtained by the electrical treatment is at times a mere coincidence? Or would not any profound impression bring about a similar result in at least some of these cases?

The two cases which died were both very bad subjects for operation, and their deaths can in no way be used as an argument against the operation. The true deduction to be drawn from the result in these two cases is that the operation should not be left as a last resort, as is advocated by Keith and the electricians, but that it should be undertaken early, and while the tumor and patient are both in a good condition of health. It is the same old battle which had to be waged so long and so vigorously in the case of ovarian cysts, and the end

will be just as surely the same—that is, removal before the woman's health is broken down, and before the tumor becomes unhealthy and adherent.

The first death occurred in a colored woman, about thirty-five years of age. The tumor was extremely irregular, and extended up to the ensiform cartilage. The patient was in the last stages of emaciation, and could only walk with the greatest difficulty. It was a serious question in the minds of some of my colleagues, who examined her, whether the disease was not splenic or a malignant omentum. I was rather inclined to the latter opinion myself, and went to the operating-table prepared to meet any condition or complication whatever. The woman, her husband, and her doctor were all told that her chances for recovery without the operation were *nil;* with the operation that they were little better, although there was some and the only chance. They all agreed upon having the operation, and it was performed at the Polyclinic Hospital in the presence of my class. The omentum was adherent over the upper part of the tumor, which proved to be a nodular uterine fibroid. The omental vessels, which were as large as the radial, were tied and cut away, and the tumor delivered. The appendages were diseased, and on one side the tube was distended with caseous matter. A good pedicle was secured, and the woman was in her bed within the hour. For five and a half days there was but a single bad symptom—a pulse between forty and fifty beats to the minute. The bowels were opening daily of their own accord, the temperature was normal, the appetite was good, and solid food was being taken with a relish. The abdomen was flat, and there was a minimum amount of pain. She was so well that her doctor was notified that she was safe. At the end of the fifth day she began to develop bad symptoms: the abdomen gradually distended, the pulse became rapid and hard, the temperature slightly elevated, the bowels obstinately constipated, food was refused, and finally vomiting set in, and she died at the end of three and a half days from septic peritonitis.

How the peritonitis was contracted is still a mystery to me: no drainage-tube was used, and the dressings had not been touched since the day of the operation. The stump was perfectly dry and sweet.

The second case was that of a white woman, thirty-two years old. Three years ago she had consulted me, and refused operation, preferring electrical treatment. Off and on during this period she was under the care of Dr. Massey, and toward the end he resorted to electro-puncture through the vaginal vault. She stood this treatment fairly well for a few times, but finally suppuration occurred and a sinus track opened on the outside of the left labia. Pus discharged freely from both the vagina and the outside sinus. When Dr. Massey asked me to see her with the view to an operation, she was bed-fast and could barely move; she was profoundly septic, and too tender to handle. A finger in the vagina disclosed a fluctuating nodule, apparently of the fibroid, in the posterior cul-de-sac. This, taken in conjunction with the discharge of pus, made a pretty clear diagnosis of suppurating fibroid tumor following electro-puncture. I gave as my opinion that the only chance the woman had for her life was to get rid of the suppurating

mass. Everybody concerned was willing and anxious that she should be given the chance, so I admitted her to my wards at St. Agnes's Hospital and performed the operation. The intestines and omentum were found adherent to the top of the tumor; the tumor was adherent in every direction to the pelvic walls; both ovaries were found posterior to the uterus, and both formed cysts as large as a goose-egg and an orange respectively; the tubes were both diseased. The appendages were closely adherent, and only freed with difficulty. It was found that the fibroid was not suppurating, but that one of the ovarian cysts was. The puncture-needle in one or more of the treatments had entered this cyst, which was almost directly in the median line, and was the "fluctuating nodule" which was detected at the first examination. The external sinus opened into this cyst, and when the tumor was removed it left the open mouth of the sinus behind, at the same time deluging the whole pelvis with the dark, virulent cyst-contents. A clean removal of the uterus and both appendages was secured; the pelvis was flushed out most carefully and thoroughly, and a drainage-tube was placed at the opening of the sinus track. In spite of all precautions, the whole pelvis suppurated, and the woman died of septicæmia on the fifth or sixth day.

Certain it is that neither of these deaths ought to weigh against the operation of hysterectomy in cases where the conditions are fairly favorable. If cases are ever to be considered last-resort ones, these come in that class, and had I been operating for statistics rather than for the good of the women, nothing would have induced me to touch either one of them.

As I have said, twelve cases recovered, and went home well women. With one or two exceptions, they were all complicated cases—short, thick pedicles, or pedicles which had to be manufactured; diseased tubes and ovaries; adhesions. One case had a nodule as large as the fist protruding into the vagina from the cervix. This mass had been sloughing for weeks, and the woman was deeply septic. The operation, which was performed at the Gynecean Hospital, was done in two stages. With knife and scissors the sloughing tumor was removed from the vagina. The instruments were quickly changed, and a supra-vaginal amputation finished the operation. So septic was the woman, that when the stitches were removed on the eighth day the whole line of the incision gave way and the intestines protruded in a mass. They remained out for about two hours before I could be found to replace them. Fortunately, my assistant, Dr. A. C. Wood, reached the hospital earlier than myself, went immediately to work, and was just replacing the protruding mass as I walked into the operating-room. In spite of this accident she made a good recovery, and is to-day well and at her usual occupation. Two of the twelve patients who recovered from the operation are dead. The other ten,

as far as I know, are alive and in better health than they have been for years. The two deaths were due, in one case, to a subsequent operation for an ovarian cyst; in the other, presumably to heart disease. About six weeks or two months after her return home, while in apparently perfect health, she was suddenly seized with syncope, and was dead within half an hour.

DISCUSSION.

DR. G. BETTON MASSEY: Dr. Baldy is to be commended for going into the subsequent history of his cases—a thing that is not often done. I must, however, take issue with him in regard to the case which I referred to him. I feel perfectly confident that in each puncture the needle went into solid tissue, and not into a cyst. The position of the nodule was that of a retroflexed uterus, a mass clearly presenting in the posterior vaginal vault. Another reason against the view of Dr. Baldy is that at no time was there any reaction from the puncture. An abscess formed, opening on the inner side of the thigh, but I certainly saw no septic condition. The temperature was not above 99.5°, and my idea of sepsis is connected with a higher temperature than that. This was her condition up to the time of operation, and in fact the woman felt so well that I had great difficulty in prevailing on her to have the operation performed. I think that, possibly, if the operation had been limited to a vaginal procedure, with the object of evacuating the pus, the result might have been different.

I think that Dr. Baldy should also have mentioned that three years ago, when the woman came under his observation, she was exceedingly tender on both sides in the region of these diseased appendages. This makes me think that the diseased appendages had been present for a long time, acting as a hindrance to the electrical work. After their condition was revealed by section the better plan would have been to remove the appendages and allow the healthy fibroid to remain.

I also want to take exception to the suggestion that the results of electricity are simply coincidences. Coincidences are very fortunate adjuvants in most of our work, but they are a mighty poor thing to depend upon. I do not think that the electrical workers throughout the world who have treated these tumors, could have gotten their results simply through coincidences.

It might also be said that the result obtained in a case which I saw yesterday was a coincidence. This was a dispensary patient that had been treated by abdominal electro-puncture as well as by vaginal electro-puncture and intra-uterine applications. Up to the time of the use of abdominal puncture, in which three needles were simultaneously employed, the progress was slow. She was quite lame from pressure on the crural nerve, and possibly from diseased appendages. In this case operation was recently urged by Dr. Baldy. As the result of these punctures, and the use of a current of 100 to 200 milliampères, she is now so comfortable that she has not time to come to the

dispensary for further treatment, the tumor being very materially reduced in size. After being an object of charity for years, she is now earning a living at general housework within half a square of this hall.

DR. CHARLES P. NOBLE: My own experience with abdominal hysterectomy has not been very large, for the reason that most of the fibroids that I have seen have not especially troubled their possessors. The majority required only medical treatment. Probably not more than ten per cent. were especially troublesome, and many of the women did not know that they had any tumor. On the other hand, as we all know, fibroids can give rise to dangerous symptoms either from hemorrhage or pressure.

In my work I have taken a view opposite to that of Dr. Baldy, particularly when the fibroid is from medium to small. If the symptoms demanded operation, I have felt that I was doing the patient the best service by removing the appendages and not disturbing the tumor. None of these cases have died, and the results have been all that could be desired. An objection to hysterectomy by the extra-peritoneal method is, that a weak spot is left in the abdominal wall which is liable to become the seat of hernia. This is one reason why I prefer removal of the appendages where it can be done. Where the appendages are diseased, particularly if pus is present and discharged into the pelvic cavity, this would influence me to remove the fibroid, particularly if it just about filled the pelvis. If this were not done, I should anticipate death from sepsis. It is practically impossible to wash out the pelvis if the tumor about fills it, and with the tumor present it is impossible to secure drainage.

I quite agree with those who urge early operations when the tumors are giving rise to trouble. I have witnessed some fifteen hysterectomies, although I have done but two myself. All of these cases have recovered. Where the operation is not complicated by adhesions, and where the patient is not broken down, I quite agree that the risk of the operation should not be greater than that of ovariotomy.

DR. B. F. BAER: I congratulate Dr. Baldy upon his success, and I believe that in the main I agree with him as to his advice in regard to operation. Where the appendages can be thoroughly removed, and the tumor is small, I should prefer to remove them, but in some cases they are so spread out that thorough removal is not possible. In such cases I prefer hysterectomy. The result in early hysterectomy is very good, almost as good as in ovariotomy, and I have become an advocate of early hysterectomy in the cases requiring operation. In my experience, fibroid tumors, as a rule, do give rise to trouble. The fact that the patient submits to an examination, and will submit to treatment by electricity, by puncture, and other methods of treatment more or less painful, and even to hysterectomy, shows that the disease does give rise to trouble. I cannot understand why it is that men of large experience say that fibroids are not attended with symptoms. It is seldom that fibroids actually kill, but often the patient would prefer death to a continuance of the suffering. When, therefore, the tumor is giving rise to symptoms, and is of such a nature that its removal is not very dangerous to life, and the appendages are not readily *entirely* removable, I prefer hysterectomy.

Dr. Baldy did not discuss methods, and therefore I shall not take up that subject, except to say that I believe the pedicle should be treated intra-peri-

toneally whenever practicable—*i. e.*, when it is small. This certainly simplifies the operation, renders the after-treatment easier, and makes the condition of the patient after recovery more satisfactory. The patient recovers as well, if not better, when the pedicle is dropped. In the case that died at the Polyclinic Hospital, I have thought the result might have been different had the pedicle been dropped. My impression is that the woman died of tympanites more than anything else, and, as is well known, the extra-peritoneal method of treating the pedicle is very apt to be followed by tympanites and obstruction of the bowel from traction on the rectum.

In regard to Dr. Massey's case, I can scarcely agree that the appendages could have been removed and the uterus left. One of the tubes was quite diseased and spread over the tumor. If any operation was indicated hysterectomy was the one, and the only portion of the technique that I would dissent from is the manner in which the pedicle was treated.

DR. BALDY: In regard to the treatment of the pedicle I shall only say that I prefer to treat it outside, and my experience has been such that I shall always employ the extra-peritoneal method. The advantages, both theoretical and practical, are in favor of this plan.

In regard to Dr. Massey's case, I can only theorize as to the point of the puncture. I think myself that the majority of the punctures extended into the fibroid, but I know that some of them had been into the cyst, thus infecting it. The cyst was densely adherent at the point of puncture. I do not think that a fibroid will always show where a puncture has been made.

I have not seen much tympanites after hysterectomy. Those cases that get well do not have distention. Where there is septic peritonitis there is always obstruction. In both of the fatal cases that I have reported there was well-marked septic peritonitis. Neither can I agree in regard to the liability to hernia after this operation. I have seen only one hernia after hysterectomy, and that occurred at the seat of the drainage-tube an inch above the pedicle. Although I see many cases after abdominal section coming back complaining, I have not seen one case of hysterectomy with post-operative trouble.

Many operators prefer oöphorectomy, and always do it where it can be done. I give the preference to hysterectomy. In some cases you cannot remove the ovaries, and in others you may not be able to find the ovaries. In the case of exploratory operation reported, I found one tube which was distended with a bloody fluid, but I could not find the corresponding ovary or the ovary and tube of the opposite side.

Sometimes fibroids do not give rise to symptoms. One case operated on had very few symptoms. The girl had been told that she had a tumor, and came determined to have an operation, feeling that she would die if the tumor were not removed. The tumor was large. There was little hemorrhage or pain, but there was one point which would in the opinion of many justify operation, and that was that the patient was only twenty-five years of age and the tumor was growing rapidly. The vast majority of fibroids I have seen have been advised to have nothing done. In future, with my present experience, I would consider such advice, in many of these cases, as unjustifiable.

FRACTURES AND INJURIES OF THE SPINE IN THE CERVICAL REGION.

Fracture of the Third Vertebra—Cervical Spinal Hemorrhage—Fracture of Odontoid—Fracture of Fourth Vertebra.

By De FOREST WILLARD, M.D.,
SURGEON TO THE PRESBYTERIAN HOSPITAL; CLINICAL PROFESSOR ORTHOPEDIC SURGERY IN THE UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

[Read December 9, 1891]

The following group of injuries to the spine, taken in connection with the cases of laminectomy reported by me in the *Transactions of the College of Physicians*, Philadelphia, January, 1890, and February, 1891, show that the prognosis in the majority of the cases of injury to the spine is determined almost entirely by the initial lesions —*i. e.*, the amount of injury which has been primarily inflicted upon the cord. In nearly all cases of spinal fracture the substance of the cord receives severe contusions or lacerations, and the resultant symptoms are not only dangerous, but it frequently happens that death ensues in a short time.

The first case shows that even very positive bone injury in the cervical region may produce symptoms of but moderate severity, provided the cord be uninjured.

Fracture of Third Cervical Vertebra.—E. R., male, aged thirteen years, fell through an elevator shaft some thirty feet. He was picked up unconscious and removed to the hospital. Upon examination a large hæmatoma was discovered over the occiput, but there were no external evidences of injury. The head was retracted and turned markedly backward; it could be bent only slightly from side to side. Rotation was possible only to a slight degree. A finger passed into the mouth discovered a distinct prominence behind the posterior wall of the pharynx corresponding to the third cervical vertebra. The rigidity of the neck muscles was great. There was no paralysis, no cough, no loss of sensation, nor could crepitus be discovered. There were no

evidences of severe pressure upon the cord. Flexion, extension, and rotation were almost impossible.

Under strong extension and counter-extension applied upward from the head and downward from the body the deformity was markedly reduced. A

plaster-of-Paris collar applied while extension was maintained was accurately fitted, so as to keep the head in a fixed position. This bandage was arranged so as to press on the occiput as high as the prominence, also to press upon the mastoid and temporal bones, and to curve forward so as to encircle the lower jaw. It then accurately fitted the neck, from whence it extended to the shoulders and passed down loosely to envelop the upper part of the thorax. This maintained the head accurately in position and prevented any movement of the upper portion of the trunk, neck, or head. This was applied in place of extension and counter-extension on account of the sensitive condition of the hæmatoma over the occiput. After the tenderness from the blood tumor had disappeared weight and pulley extension were applied to the head and feet up to the point of comfortable endurance. The plaster envelopment was sawn open and permitted to remain as a splint to prevent lateral rotation and flexion.

He was kept in this position for six weeks. There was no impairment of motion or sensation during this time. The extension apparatus was then removed and an accurately fitted neck splint of plaster-of-Paris was applied. He wore this with comfort six weeks longer. At the end of this time examination of the pharynx showed that while there was still a slight prominence in the posterior part of his throat, the deformity was much less evident than at the time of the injury. There was still less rigidity, but no deviation of

the vertebral column could be discovered. The absence of pressure-symptoms resulting from the injury was a point of special interest. A year later he could move his head in all directions, although motion of the chin to the right was limited. Flexion seemed perfect. It is but seldom that a patient either breaks or dislocates his neck without more serious symptoms.

Cervical Spinal Hemorrhage.—W. M., aged eighteen years, was injured by diving eighteen feet into a pool of water two feet deep. He struck his back and the back of his head on the bottom of the pool. He was immediately pulled out by his comrades and was found to be unconscious. He remained in this state two hours. When first seen, some time later, he was blanched and pale, and complained of a pain in the back of his neck and beneath the shoulders. Sensibility was present throughout body and legs but apparently diminished. There was no opisthotonos, and no rigidity of the neck other than that motion gave slight pain. There was no tenderness over the region of the spinal cord, except slight pain in the lower cervical region. There was no visible displacement of the vertebræ, and no positive evidence of dislocation or of fracture. Flexion, extension, and rotation of the head were perfect and accompanied with only slight pain. The spinal column could be flexed and extended normally. Motion and extension in both arms, body, and legs seemed in good condition, except as regards sensibility as above noted.

He was partially conscious and could answer questions intelligibly, but with an apparent effort of the will, and his speech was slow. There was anæsthesia of both hands, especially on the ulnar side. He complained of pain in the region indicated. There was constant and decided priapism.

This condition continued until about seven hours after the accident, when he slowly seemed to lose power of the hands and forearms on both sides, commencing apparently in the region supplied by the ulnar nerve. Also there was progressive loss of sensation in both hands and forearms. Both brachial plexuses were sensitive to the touch, but not painful. Priapism still continued, but the urine was voided naturally. The scrotum was anæsthetic and remained so for several days, and uncertain areas of the abdomen seemed in the same condition, but his answers to questions were not very satisfactory. The legs retained both motion and sensation, although both functions were apparently diminished.

The patient seemed to rouse from his unconsciousness at the end of the first hour and was moderately intelligent.

Up to this time extension made upon the spinal column by means of the head gave relief from pain, therefore an extension and counter-extension apparatus was applied to the head and extremities, and continued traction was maintained.

Loss of motion and sensation increased during the next twenty-four hours until the patient was able only to move his arms feebly; fingers immovable. Sensation was entirely absent in both hands in the region supplied by the ulnar nerve. Sensation was impaired in other regions of the forearm and hands.

During the next two days there was apparently no change either as regards motion or sensation, but on the following day both functions began slowly to return.

At the end of the fifth day he could raise his arms, but only for a moment. When the extensor muscles were required to fulfil their functions the arm immediately fell. There was still a tendency to priapism, but the condition was not constant; the scrotum was still anæsthetic. Temperature, pulse, and respiration remained unaltered.

Continuous extension was maintained, and as there was no paralysis it was deemed probable that all hemorrhage within the canal had ceased.

Motion and sensation returned to a slight degree in the thumb and fingers of the hand and in the arm, until gradually both functions were restored almost entirely. The scrotum remained anæsthetic for ten days.

Fifteen days later he could grasp an object with considerable firmness.

A trapeze was rigged over the bed so as to exercise the arms while extension was being maintained. An ischio-rectal abscess discharged for two weeks and then healed.

In eight weeks he had thoroughly recovered and presented no abnormal symptoms. Motion and sensation complete.

A peculiar condition regarding this case was that after the condition of shock had passed away there were no serious symptoms until the probable occurrence of hemorrhage had begun to make pressure upon the spinal cord and thus to interfere with its functions. The occurrence of paralysis upon both sides instead of upon one, and the length of time after the injury, showed that the symptoms must have been largely due to gradual compression.

Fracture of the Odontoid Process of Axis with Dislocation of Atlas.—C., aged eighteen years, fell twenty feet, striking upon his head. He was picked up stunned, but soon regained consciousness. He was able to walk to his home, several squares distant, and to talk with his friends. An hour and a half later he was perfectly rational, talked freely and pleasantly, and complained of no pain when at rest; he simply desired to be permitted to sleep. He was quiet, but would suddenly start with an anxious look. The trunk and extremities were cold; pulse 85, feeble. Pupils equal, but failed to respond readily to light. The head was thrown backward with the occiput to the right, but he complained of no pain. The chin protruded, and the thyroid gland was prominent. Any movement or rotation of the head toward the right was accompanied with pain. Motion to the left was painless for a quarter of a circle, but any greater motion caused discomfort. There was no contusion or laceration of any part of the body; no depression of the skull, nor any evidences of fracture of the cranium. Pressure over the cervical region gave severe pain. The spinous processes of the cervical vertebræ were in line up to the third, but above this was a marked depression, while a little higher the position of the atlas was slightly projecting to the right of the median line. Manipulation caused so much pain that ocular examination of the pharynx could not be made. Digital examination revealed a slight prominence of the second vertebral body.

Diagnosis.—Dislocation of the axis from the atlas; probable fracture of odontoid.

During the night he slept at intervals, but roused at the slightest noise. There was no pain, except upon movement of the head.

In the morning he took nourishment, and complained of no suffering. He ate a light breakfast, and was anxious to go to his business. Three hours later he began to grow drowsy, and in two hours became semi-unconscious, but could still be roused. He answered questions intelligently, but closed his eyes as soon as he had ceased speaking. The tongue was protruded straight from the mouth, and with difficulty; the pupils responded to light; the right eye was a little more responsive than the left. There was no paralysis, except of the bladder, the urine not having been passed since the accident. The catheter secured eight ounces of apparently normal urine. Pulse was 80, full; respiration 16, deep but not snoring.

Twenty hours after the injury the pulse was 48; respiration 12, somewhat stertorous, not puffy nor blowing. Could be roused only with effort. Answered unintelligibly; occasionally, however, an articular word escaped. He constantly pulled at the bedclothes. The urine dribbled. Pupils were nearly the same size, but the left responded more readily to the light. At the junction of the forehead with the hair, for an inch and a half to the left of the median line, apparently the point where the head came in contact with the ground in the fall, the scalp was œdematous and there was a slight depression. Pressure upon several points in the same region gave similar pitting. No evidence of fracture.

No injury could be discovered in any portion of the body save the neck.

There was no paralysis of any portion of the body, but there was slight impairment of motion of the right arm and leg. The head could be moved with little more freedom toward the left, but a slight force caused the patient to cry out and to steady his head with his left hand. There was rather less deformity than at first at the back of the neck; the thyroid was not so prominent. Liquid food was taken without difficulty. He passed a restless night pulling at the bedclothes, tossing about, and muttering in delirium.

Forty hours after the injury it was noticed that he moved the right arm and leg less frequently, although both members could still be brought into use by a special effort of will. Pupils as the day before; respiration also; pulse 60. The patient responded to loud shouting, but could give no intelligible answers, although frequent attempts at utterance were made. The urine dribbled constantly.

Seventy-two hours after the accident the pulse was 100; respiration 20. Increased loss of power, but members still capable of being moved.

Eighty-four hours after the injury the pulse was 130, feeble; respiration 24. Delirium less violent. Patient remained quiet, except when partially awakened. When roused by any cause the left hand still pulled the bedclothes. The right arm and leg were still capable of being moved slightly, but the muscular power was weakened. Unconsciousness increased, with total inability to speak. Bowels not moved since the accident. Pupils normal in size, still contracting under the influence of light. Liquid nourishment had been swallowed up to this time, but was now refused. Died quietly ninety-eight hours after the injury.

Post-mortem: Examination of the neck alone was permitted. The posterior cervical muscles were filled with extravasated blood from the occiput to the

fourth vertebra. The spinous prominence of the atlas lay to the right of that of the axis and on a plane posterior to it, causing the axis to appear as though it had been pushed forward. In reality, however, its position in relation to the third vertebra was normal—the atlas being the dislocated bone. The left inferior articular process lay behind the articular process of the axis, while the right inferior articular process of the atlas lay anteriorly. This displacement was permitted by a fracture of the odontoid process of the axis. One fracture extended directly across its base, while the other had broken off a small portion of the anterior surface—the line of the fracture being almost at right angles to the first. The odontoid process, however, was still held in position by the transverse odontoid ligature, which was unruptured. As noticed during life, the atlas could not be rotated to the right, while it could be turned to the left. Strong extension made upon the atlas permitted it with difficulty to be brought into position.

Fracture of the Third, Fourth, and Fifth Laminæ; Death.—W. P., aged forty years, fell from a scaffolding, a distance of twenty feet, striking the top of his head on a curb, and alighting as nearly as possible with the axis of his body in a straight line. When seen half an hour later he was suffering from shock. His pulse was 80, and his respiration feeble. He was perfectly conscious, but indifferent to surroundings. There was a large, lacerated wound of the scalp four inches in length transversely across the forehead. In the region of the third and fourth vertebræ there was marked displacement forward of the third with prominence backward of the fourth dorsal spine. There was total paralysis of both motion and sensation, and of all parts of the body below the portion supplied by the corresponding nerves. Neither urine nor feces had been passed since the accident. There was no priapism. Extension and counter-extension had no effect on the deformity.

The patient rallied for two hours, the pulse reaching 110 and the temperature 100°. He complained of a great deal of pain in the back of his neck and shoulders. Soon afterward the respiration became more hurried, the heart's action much more feeble, and although perfectly conscious for one or two hours, he soon sank into a state of drowsiness, and died ten hours later.

At the autopsy there was found a fracture of the body of the fourth dorsal, with fracture of the laminæ of the third, fourth, and fifth. The third was greatly displaced forward, carrying with it a fragment of the fourth. The cord was entirely torn across at the junction of the third with the fourth, and was pulpified for half an inch and compressed by the fragments of the other laminæ.

Laminectomy would have relieved pressure, but would not have restored the crushed and torn cord.

DISCUSSION.

DR. JAMES HENDRIE LLOYD: I am sure that Dr. Willard will recall the case of a little Italian girl at the Home for Crippled Children. Hers was a case possibly of dislocation of the odontoid process. The exact nature of the trouble was never ascertained, as the child recovered. She fell from bed and

was picked up with the injury to the neck. She was admitted to the Philadelphia Hospital, under my care, some weeks after the accident. At that time she was markedly paralyzed, and the muscles of the arms had undergone a certain amount of degeneration, indicating an injury of the cervical portion of the cord. Under prolonged rest in bed, followed by a plaster jacket and jury-mast extension, the child made an excellent recovery, although there was still some deformity in the region of the spinous process of the third cervical vertebra and slight projection in the pharnyx. She spent more than a year in the Home for Crippled Children after her discharge from the hospital, so that I had an excellent opportunity to watch her subsequent history. There was no relapse or return of paralysis after a year on her feet.

OPHTHALMIA NEONATORUM AS A CAUSE OF BLINDNESS.

By T. B. SCHNEIDEMAN, M.D.,
INSTRUCTOR IN OPHTHALMOLOGY IN THE PHILADELPHIA POLYCLINIC; OCULIST TO ST. CHRISTOPHER'S HOSPITAL DISPENSARY, ETC.

[Read December 23, 1891.]

My object in bringing this subject before the Society is to direct attention to a disease which is responsible for about one-third of all cases of blindness, of which a most important means of prevention—that of public legislation—can only be obtained by the active intervention of medical societies. The following case is presented, not because of its novelty, unfortunately, but as somewhat typically representing the lamentable result of negligence or ignorance.

H. M., aged three years. Both eyes became sore when five days old. O. D.: Dense adherent leucoma, lower inner portion of cornea. Remainder of cornea hazy, stretched blue-gray iris in contact with it. Globe apparently somewhat distended; leucoma prominent but easily covered by lids. T.: Normal. O. S.: Leucoma slightly denser and more prominent but not larger. Broader space of translucent cornea than O. D. R. and L. light perception.

The subject has been very thoroughly worked out in Europe, and a mass of statistics has been accumulated. According to the report of the Royal Commission on the Blind, published in 1889, 30 per cent. of the inmates of the institutions, and 7000 persons in the United Kingdom, have lost their sight from this cause. Professor Magnus, of Breslau, finds that no less than 72 per cent. of all who become blind during the first year of life are rendered so by purulent ophthalmia; and even of those who become blind before the twentieth year of life, it constitutes as much as 23.50 per cent. Looking at the subject in another way, he shows that of 10,000 children under five years of age, 4.28 are blinded by purulent ophthalmia. In the blind asylums of Switzerland the proportion who have lost their sight from this disease is 26 per cent.; in the asylums of Austria, Hungary, and

Italy, about 20 per cent.; while in Spain and Belgium it falls to about 11 or 12 per cent. And in this city Dr. Harlan, as the result of examination of the eyes of 167 inmates of the Pennsylvania Institution for the Blind, found that 55 owed their affliction to purulent ophthalmia, and more than half of these were of the form occurring in infants.

The lesson taught by such statistics is not simply that ophthalmia of the newborn is the most common cause of blindness; if that were all, they would no doubt still preserve a melancholy interest, but they have a much greater importance, for they tell us that it is quite within our power to have prevented the great affliction of blindness in one-third of those who are deprived of sight. For it is hardly too much to say that no one should lose his sight from this disease; not only because it is quite amenable to treatment, if this be instituted from the beginning, but because the disease itself can be prevented in most instances if those who have the care of mother and child understand the nature of this affection.

Ophthalmia of the newborn is an *infectious* disease, and can only occur after the infectious matter has come into actual and somewhat prolonged contact with the conjunctiva. The noxious matter is in every instance derived from an inflamed vagina (or urethra), or from another eye. In the great majority of cases infection takes place from the vagina, and it is to be remembered that the disease is not caused by the secretion of a specific (gonorrhœal) catarrh only, but that it may be produced by the secretion of a simple leucorrhœa, or at least by what is recognized as such clinically.

As regards the period when infection occurs, this may take place either during or immediately after birth, or at some subsequent moment. In the former case, the *materies morbi* is derived directly from the vaginal secretion. The child passes through the parturient canal with closed eyes, hence during the passage of the head the secretion can only penetrate into the conjunctival sac in very small amounts, if at all, but it remains adherent to the eyelashes and edges of the lids, and can readily gain an entrance into the eyes as soon as these are opened and the child winks upon the escape of the head. Infection may take place during birth, if anything occurs to displace the soft parts of the face, as may happen in protracted and difficult labors, large size of head, etc., conditions more likely to be present in primiparæ, and with the larger heads of male children. But the time most fraught with danger is usually the moment the head escapes and the child first opens its eyes. In the majority of cases, infection takes

place at some time during labor, and the disease first manifests itself from the second to the fifth day; if it does not appear until later, infection took place subsequent to birth. This may happen by the transference of secretion to the child's eyes in various ways, as by the hands of the attendant, by soiled linen or sponges, etc.; but the lochial discharge, as such, has been found to be incapable of causing the affection, if the woman be free from disease.

The discovery of the gonococcus has led investigators to examine the secretion of purulent ophthalmia for the same organism—and in the vast majority of cases examined it has been found to be present therein also; still, different observers appear to have reached results not entirely in accordance as to the relative frequency with which this organism is present. Cases do occur in which it cannot be found. Hence the attempt has been made from a bacteriological point of view to recognize different forms of the disease—a specific form and simple inflammatory forms. As stated above, the secretion of simple vaginal catarrhs are capable of causing purulent ophthalmia.

Formerly this disease was attributed to a variety of causes, such as injuries received by the eyes during birth, icterus, chilling of the body, intense light, etc., but these views are, of course, no longer entertained. Ordinary pus and even decomposed pus cannot produce it. Purulent secretions from lachrymal abscess and caries of the orbit frequently get into the eye, and do produce inflammation of the conjunctiva, but not the ophthalmia of the newborn with its great liability to involvement of the cornea. Putrid flesh, putrid blood, and even pure cultivations of various microörganisms, have been introduced into the conjunctival sac without any ill effect.

Prophylaxis to be efficient must, of course, first of all recognize the infectious nature of this affection, and secondly, the source whence the infectious matter may be derived.

Among general measures are to be placed all influences which can be employed to impress upon the public the dangerous character of all affections of the eyes of young children. Like all similar diseases, this affection is most prevalent and destructive among the poorer classes, who do not usually employ a physician to attend them in confinement, but rely upon a midwife too often but little better instructed than the woman she attends.

In some dispensaries for the treatment of diseases of children, a small tract is handed the mother or attendant who brings the child, giving advice as to the proper care of infants, their diet, bathing, etc. A few lines might be added calling attention to the serious nature of

this inflammation—ignorance of which and the proneness to ascribe every affection to "catching cold," which will get well of itself, is responsible for many ruined eyes. With this end in view, it might be advisable to have articles appear in the public prints from time to time explaining the danger of the disease in question and urging the importance of immediately attending to every case of inflammation of the eyes of the young child. Even the ignorant classes understand the dangerous nature of certain other diseases, such, for example, as diphtheria and scarlet fever, and if ophthalmia of the newborn could be added to these, the deplorable results of neglected cases would be less frequently observed.

To reach this class (namely, midwives—undoubtedly responsible for the great majority of those unfortunates who have become blind from this disease) it has been proposed to compel all such to report every case of ocular inflammation at the earliest possible moment to some physician. Such laws are in force in certain countries of Europe, and there appears no good reason why a similar law might not be enforced in this country, just as there are laws requiring other contagious diseases to be reported. If this could be done with any degree of efficiency, it would do more toward abolishing loss of sight from this cause than any other measure. The State of New York has such an act in operation, requiring midwives and nurses to report every case of inflamed or reddened eyes occurring within two weeks after birth to some legally qualified practitioner within six hours, under penalty of a fine or imprisonment, or both. This law has been in operation for a little more than a year, hence it is too early to obtain much information as to its practical working. A few convictions would direct the attention of that class which it is desired to reach, to this subject, and in this way be productive at least of a certain amount of good.

As regards special measures of prophylaxis, these were clearly formulated as early as 1807 by Gibson in the following principles, which all later experience has tended to confirm. They are, first, to cure the leucorrhœa of every pregnant woman when possible; or failing in this, second, to disinfect the vagina during labor; and third, to remove the secretion from the child's eyes immediately after birth by a fluid which renders the secretion harmless.

Notwithstanding their importance, I shall here pass over the first two and consider briefly the third of these indications. Of all the methods employed none have yielded better results than the one recommended by Credé. This consists in dropping into the eye a two

per cent. solution of nitrate of silver after simple preliminary washing with clean water. Other agents, such as carbolic acid and boric acid, have been tried, but none gave results so satisfactory as the silver, perhaps because the latter has the power of penetrating deeper into the tissues. As a proof of the efficacy of this procedure in diminishing the number of cases of purulent ophthalmia of the newborn the following figures, all obtained from the same hospital and the same attendants, furnish the evidence:

Children.	Treatment.	Per ct. blenorr.	Per ct. catarrh.	Total.
1092	No treatment.	4.75	14.5	19.25
1541	2 per ct. of carbolic acid.	1.42	6.	7.42
1250	2 per ct. of silver nitrate.	0.72	4.72	5.44

And similar good results have been obtained in other lying-in hospitals. Still this method, which is somewhat severe, is not necessary in every case in private practice, although, even if unnecessary, it is quite devoid of serious danger. As a milder measure, simple washing the eyes with clean water as soon as the child is born has been found efficient in diminishing the number of cases of the disease; but in any case in which there is a history of copious purulent discharge from the vagina, it would be advisable to employ the silver solution as recommended by Credé.

As regards the disease itself, it is almost superfluous to present any formal description; its phenomena are so characteristic that it is impossible to mistake its nature when fully developed. The swollen and reddened eyelids, the upper drooping and partially overlying the lower, the great difficulty or even impossibility of opening the eyes, the profuse purulent discharge welling forth as the lids are gently separated by the finger, the pain and heat, the swollen conjunctiva, rising like a mound, in which the cornea is buried—all these go to make up a picture which cannot be overlooked nor confounded with any other. But that every inflammation, however slight, affecting the eyes of a newborn child may, if neglected, become the fully developed disease, and that too in a day or two, should always be in the mind of every one who has any connection with the case.

The danger of this disease consists, of course, in the great liability of implication of the cornea, leading to perforation of this structure, with the serious results dependent thereon. It was formerly believed that the cornea, being an avascular structure, became affected from interference with its nutrition by the pressure of the swollen conjunctiva; but while such pressure may be unfavorable to the nutrition of this structure and predispose it to yield more readily, the direct

cause of the corneal disease is infection from the microörganisms which have their nidus in the profuse purulent secretion, upon the recognition of which depends the rational and efficient treatment of this disease. This consists, first of all, in the removal of the pus from the conjunctival sac as soon after it is secreted as possible; second, to render innocuous any portion of the secretion which remains in the eyes by appropriate germicides; and thirdly, to act upon the inflamed secreting membrane by some agent capable of modifying this surface and checking or diminishing its secretory activity for the time being.

The particular means adapted to carry out these indications are various, and the methods selected vary somewhat according to the preferences of different physicians. To disinfect the conjunctival sac almost all the antiseptics employed in general surgery have been used and with more or less good effect. The following plan has been found so efficient as to leave little to be desired: The attendant should remove the pus once every hour during the height of the disease; this can be done by gently separating the lids and flooding the conjunctival sac repeatedly with an ordinary pipette or dropper until the cleansing fluid returns clear and unmixed with pus. The fluid employed is a rather strong solution of bichloride of mercury, 1 : 2000. Besides its mechanical effect in flushing the sac and so removing the pus, it is one of the best germicides that can be employed and withal entirely safe. Other agents might be made use of, such as carbolic acid in two per cent. solution, saturated solutions of boric acid, though the latter seems inert as a germ destroyer, at least according to laboratory experiments, nitrate of silver, etc.; but none of these agents have any advantage over the bichloride. To meet the third indication, to modify the inflamed membrane, a rather strong solution of nitrate of silver, ten, twenty, or even forty grains to the ounce, should be applied once or perhaps twice in the twenty-four hours to the everted lids by the surgeon. The application can be readily made by wrapping a pledget of absorbent cotton around a match-stick, dipping into the silver solution until saturated and then gently and thoroughly applying it to the palpebral conjunctiva. No subsequent washing with sodium chloride solution is necessary. The above treatment, simple as it is, gives results entirely satisfactory. I do not recall a single case in which it was practised that did not result in perfect recovery without damage to the cornea, although in some cases the disease had existed for a number of days and in a number of instances the cornea was so greatly infiltrated when the patient first came under

treatment as to cause fears of immediate perforation. In those cases in which the cornea becomes affected, as evidenced by partial opacity, atropine, or, in some cases, eserine, should be instilled into the eye—for if, unhappily, perforation should occur, the eye will be more likely to preserve some degree of useful vision if prolapse of the iris can be avoided.

If one eye only is affected, the question arises how to prevent infection of the other eye. The shield to protect the sound eye is not applicable in infants as it is in adults. Great cleanliness, constant removal of the secretion, making the child lie on the affected side, will prevent infection in many cases. It might also be advisable to use the bichloride or the silver solution as a prophylactic measure.

Finally, in those cases in which perforation with its usual results of adherent iris, etc., has occurred, something may be done by operative interference if any portion of the cornea remains clear. Here the indications are to free the iris from its adhesions to the cornea lest total staphyloma supervene. This procedure may be difficult to carry out, may involve extraction of the lens, and in any case would hardly give more than perception of very large objects.

DISCUSSION.

DR. GEORGE E. DE SCHWEINITZ: Unfortunately, I came into the room too late to hear the first portion of this paper. There is no question that bichloride of mercury, under ordinary circumstances, is an excellent germicide, but in spite of the good results which have been reported, I am very much against the use of strong solutions of this drug in ophthalmia neonatorum. It is true that investigations have shown that a solution of 1 : 10,000 will retard the vitality of certain bacteria—for example, staphylococcus pyogenes aureus; but in ophthalmia neonatorum and in gonorrhœal ophthalmia the characteristic behavior of the gonococci is their residence within the living cells, and under these circumstances I do not believe it is possible for irrigations of bichloride of mercury to act in their ordinary germicidal function. Moreover, I am convinced from clinical and direct histological experience that strong solutions of sublimate have a distinctly deleterious effect. I need not refer at any length to the disastrous results to the cornea that have occurred from the use of this drug in strong solutions during cataract operations. Especially is this true when they have been employed to irrigate the anterior chamber. It is of the highest importance during ophthalmia neonatorum that the epithelial surface of the cornea shall be kept intact; and while I am not prepared to say that the use of a strong solution can actually produce an abrasion, I am well satisfied that it adds distinctly to the dangers of the case. A recent European investigation in regard to the effect of this drug

upon the cornea has demonstrated its capacity for producing changes that might well make one hesitate in its employment in very active strength. It should be remembered that during the height of an attack of ophthalmia neonatorum the resisting power of the cornea is materially decreased, and hence very irritating solutions, no matter of what composition, are to be deprecated. I beg to be understood in this matter; I do not for one moment dispute the value of bichloride in purulent affections of the conjunctiva, but I deem it inadvisable to use the drug in strong solution, and believe that it is impossible to employ it *safely* in such strength that it will act as a *true germicide*. Moreover, it has been shown that bacteria in the presence of albumin have the power to reduce bichloride of mercury to calomel. Now calomel, to a certain extent, is a germicide, but must have very inferior qualities under these circumstances. There does not seem to be any objection, for cleansing and antiseptic purposes, to a strength of 1 : 10,000 (Cohn, in his recent book, recommends 1 : 5000). A convenient strength is a grain to the pint—*i.e.*, about 1 : 7500. In the Philadelphia Hospital, as my colleague, Dr. McKelway, will testify, we are in the habit of using alternately a solution of bichloride of mercury, a grain to the pint, and a saturated solution of boric acid. If the cleansings are made hourly, first one and then the other drug is employed. Boric acid is without germicidal value, but it is an excellent slightly astringent cleansing agent.

Referring to the other portion of the treatment advocated by the Doctor in his paper, I beg to agree with him most emphatically—*i.e.*, with his use of nitrate of silver. It should not be employed in the earlier stages, or in any stage in which there is much infiltration and the formation of false membrane; but when there is free secretion of yellow pus, when the lids are supple, when the conjunctiva is covered with hypertrophied papillæ and positive granulations, nitrate of silver, in the strength of ten to fifteen grains to the ounce, is the germicide *par excellence*. Applied carefully with a cotton mop, and properly neutralized, if strong solutions are employed, any irritating effect upon the cornea may be avoided. It acts in three ways: as a germicide, because it is at the same time a superficial caustic, destroying a layer of epithelial cells and probably the bacteria which are contained within them; as an astringent; and as an alterative, using that term to imply its efficiency to alter the nutrition of a mucous membrane which is inflamed.

In regard to the other solutions which various surgeons have employed in this condition—carbolic acid, aqua chlorini, weak solutions of nitrate of silver, etc.—my experience is limited. They come to us endorsed with high authority. In regard to one drug, however, I wish to place myself on record—namely, pyoktanin. I hope that no one will treat cases of purulent ophthalmia in the newly-born with this drug.

Finally, I may say that, in my belief, the more or less continuous application of cold is of great value in the earlier stages. The essayist has referred to atropine and eserine, evidently giving his preference to the former drug, should corneal ulceration indicate its use. I would reverse the order, and place eserine first, provided no iritic complication contra-indicates its instillation.

DR. CHARLES H. THOMAS: There is one suggestion growing out of what Dr. Schneideman has said which seems worthy of further amplification—that

is, the question of some legal enactment which shall help to prevent the blindness which is so frequently the result of ophthalmia neonatorum. Such a law has been enacted by the State of New York, and there has been some attempt to establish one in the State of Pennsylvania. It seems to me that there is no place in the State of Pennsylvania where a movement with this object in view could be more effectively inaugurated than in this Society. It is my hope that all who have heard this very able and true statement will resolve themselves into a committee to further the enactment of such a law as has been suggested. There is no question as to the propriety of compelling midwives to report such cases, and I am not sure but that we could go further with propriety, and require medical practitioners to report these as well as other cases of infectious diseases. There are, of course, many physicians who should not be put to this trouble, but there are others who see but few such cases, and it would have a wholesome moral effect upon all to feel that this disease was dignified enough to require a report to the Board of Health.

DR. CHARLES P. NOBLE: I will speak upon this subject from the standpoint of the obstetrician rather than from that of the ophthalmologist. There are several points which interest me. I am much pleased to find that so long ago as 1807 someone had insisted upon the fact that the treatment of ophthalmia neonatorum should begin with the mother. This has been insisted upon by various obstetricians, and I have myself long felt the importance of it. It has been a rule with me for some years to pay attention to the question of vaginal discharges in pregnant women. If there is a free vaginal discharge, even though no complaint is made of its irritation, I have always made a local examination, and if vaginitis were found to be present, have insisted upon systematic local treatment. I think that this is a most important point, and one that is even more important than the early treatment of the eye. If we can prevent infection, we do not need the early treatment of the ophthalmia. Some years ago, when connected with the Lying-in Charity, I saw quite a number of cases, and I have had several in private practice. I may say that among these cases there was only one in which an eye was lost. This occurred in a syphilitic infant. In this case Dr. Lautenbach acted as consultant, so that the child had everything that ophthalmological science could do for it. The treatment used at the Lying-in Charity was frequent irrigation with a saturated boric acid solution. When the discharge was very free, it was used as often as every half-hour, together with silver nitrate solution (ten grains), used twice daily. It was thought that advantage was derived, particularly when the swelling was great, from the application of cold compresses.

Speaking still from the standpoint of the obstetrician, I should advise that the practitioner always avail himself of the counsel of an oculist in the management of such cases. He will thus be saved the anxiety and regret of occasionally losing an eye, and forever injuring the prospects of the infant.

On motion, the following committee was appointed to confer with the State Board of Health relative to this subject: Drs. T. B. Schneideman, C. H. Thomas, Benjamin Lee, Edward Jackson, and G. E. de Schweinitz.

SOME MOOTED POINTS CONCERNING THE VOMITING OF PREGNANCY.

By T. RIDGWAY BARKER, M.D.,
DEMONSTRATOR OF OBSTETRICS IN THE MEDICO-CHIRURGICAL COLLEGE, PHILA.; OUTDOOR OBSTETRICIAN TO THE PENN DISPENSARY.

[Read December 23, 1891.]

In discussing the etiology, symptomatology, and prognosis of the digestive disturbance associated with gestation known as morning sickness, or the vomiting of pregnancy, it becomes necessary at the very outset of a comprehensive study of the subject to exclude those forms of gastric trouble which, while often accompanying this purely physiological process, are nevertheless not dependent upon it for their existence, but upon some prëxisting morbid condition which is simply aggravated by the changes incident to gestation.

Failure to appreciate and differentiate between these forms of gastric disturbance is largely responsible for the confusion and misconception which is so general, hence the existence of such a multitude of views as to the cause and gravity of the vomiting of pregnancy.

It becomes necessary, therefore, that we state clearly that when we speak of morning sickness we do not include the so-called vomiting *in* pregnancy, but confine our remarks solely to the vomiting of pregnancy. Without further explanatory remarks, let us proceed to a consideration of the subject from a scientific standpoint—ever mindful, however, how easy it is to advance a theory and how difficult to find evidence to support it. That the occurrence of vomiting without apparent cause in females who have exposed themselves to the risk of conception is a sign of much importance is generally admitted, since it so quickly follows cessation of menstruation, and therefore further tends to confirm the presumptive evidence of pregnancy. With reference to its etiology, one finds as many views as there are stars in the sky, each differing from the other in magnitude and brilliancy even as these distant orbs of light. Let us then turn away from such a merry-

go-round of medical opinion and seek to discover the truth in the realms of anatomy and physiology rather than in the domain of idle speculation.

Coincident with conception, we find a general rise in the intra-pelvic blood-pressure resulting in increased activity on the part of all the viscera therein contained which are concerned in the process of reproduction. Cells heretofore carrying on a passive existence now spring into a high state of activity. Likewise there occurs hyperplasia and hypertrophy of tissue, which is especially rapid in the uterine muscular elements. Nerves, which in the unimpregnated condition possess but a low grade of sensibility, now become highly sensitive and transmit readily to their respective centres slight disturbances which under other circumstances would fail to throw them into a state of activity. What relation, one may very properly ask, exists between the vomiting of pregnancy and this exaltation of the nervous system? A causal one, most assuredly!

Can one fail to realize that this is a symptom of pregnancy due to the change in the nervous equilibrium induced by the process of gestation? Surely not. Rather are the nausea and vomiting expressions of a reflex irritation having its origin at the end-organs of the uterine nerves, which, as we have seen, are in a hyperæsthetic state. As the growing ovum demands, day by day, an increased space for its development, these end-organs are subjected to a varying degree of irritation which is transmitted to the centres and thence reflected out along the nerve-filaments distributed to the stomach. Why this affection is of more frequent occurrence and of greater severity in the first than in subsequent pregnancies one can readily understand by comparing the cavities of the primiparous and multiparous organs.

We find in the former that the uterine muscular walls are convex and nearly, if not quite, in apposition, hence the capacity of the organ in these females is relatively less. Not so the multiparous uterus, for its walls are concave and the capacity is further increased in length by half an inch owing to incomplete involution on the part of Nature after the first pregnancy. Need we seek for more conclusive evidence than this to support our position? Is it not plainly to be seen that the resistance in the primiparous organ will be greater and the nervous disturbance more pronounced than where the cavity is larger, thus allowing the ovum to undergo its development without interference? Further, the period when nausea and vomiting are most apt to occur is in the second month, at a time when the growth of the uterus is principally lateral and the villi of the chorion are thrusting

themselves into the serotine or placental decidua. As to the character of its onset, it is usually gradual and disappears in a similar manner as the uterus rises out of the true pelvic cavity, thus having quite ceased by the end of the fourth month.

Concerning the symptomatology of this affection, it has not a few well-defined characteristics. The primary nausea and oppression experienced over the epigastrium soon gives place to vomiting—not, however, preceded or accompanied by any degree of nervous depression as is the case with emesis under all other circumstances. The food, if any is present in the stomach, is expelled, not violently nor with any amount of retching, but almost as if it were regurgitated. Should the stomach be empty, then simply a little clear, normal gastric mucus is raised, which, as it usually occurs early in the morning, has given rise to the popular appellation of morning sickness. Further, if the matter vomited be food, it will not be found on examination to be sour or to have undergone decomposition but in a more or less perfectly digested state, depending upon the length of time since its ingestion. As to the subsequent amount of nervous depression, in most instances it is practically *nil*, even when the vomiting is frequent and of long duration. This fact is very noticeable in some cases; the pregnant female may have just finished a hearty meal—for impairment of the appetite is rather the exception than the rule—when almost immediately afterward she will be obliged to evacuate the stomach, only to turn to the piano and find consolation for her lost breakfast. Rarely does one meet with a case of vomiting of pregnancy where the female's health has materially suffered, and this is what one would reasonably expect from a study of the symptomatology of the affection.

That this digestive disturbance is a purely sympathetic one is proven by the fact that by a strong effort of the will the female can not infrequently ward off an attack.

Should she, for instance, have accepted an invitation out to dine during this period of gestation, she can control the nervous irritability by a firm determination not to betray her condition to the assembled guests. It has been repeatedly asked, How can a woman suffer from morning sickness at one period of gestation and not at another?—in other words, how is it that the attacks vary in severity in different pregnancies? Moreover, why is it that one pregnant woman has morning sickness and another does not? Can this be explained on the hypothesis of reflex nervous irritability? Most assuredly!

The variability in the duration and severity of the affection is due to two factors: Greater or less irritation, and greater or less irritability.

The question may here be asked, Is vomiting of pregnancy a physiological or a pathological process?

It has been stated that among women of a strong, robust type, vomiting of pregnancy is exceptional rather than the rule, as is the case in Europe and America. But this fact has no direct bearing on the case; it goes without saying, that the stronger and less sensitive the nervous system the less general and severe will be the sympathetic disturbance. One certainly is not warranted in stating that the vomiting of pregnancy is a pathological process, for it is due to a purely physiological cause. There exists no morbid alteration in structure or function of the nerves. The irritability is not pathological but physiological, depending upon the degree of sensibility of the nervous apparatus. Yet it has been claimed by some investigators that this very exaltation is evidence of some pathological lesion. Surely not. It were, it seems to me, as reasonable to declare a person's brain diseased because he is irritated by Wagner's music, in which he finds no harmony, as to declare that the sympathetic disturbance excited by pregnancy is due to some morbid process.

Again, if we select two galvanometers, one registering the weakest electric current, the other equally well constructed but less sensitive, we cannot say that the former is any more perfect than the latter; they differ simply in the degree of their sensibility. Difference in sensibility within certain prescribed limits is a physiological, not a pathological fact. While vomiting, as Austin Flint points out, is not, strictly speaking, a physiological process, yet under these circumstances it is far from pathological; rather let us say it is the pathological expression of a physiological process. The vomiting of pregnancy, unless complicated by some morbid process, never gives rise to alarming symptoms or threatens life. If prolonged beyond the period of quickening, its continuance may be accepted as positive evidence of some complication which a decided alteration in the character of the vomited matter will usually indicate.

Cases of pernicious vomiting call for diligent search for organic lesions in the nervous system or structural changes in some of the generative or associated organs. That the vomiting of pregnancy occurs in healthy, strong women almost as frequently as in their less robust sisters, though in a milder form and of shorter duration, only confirms the view as to its physiological nature. The view advanced, that the difficulties of parturition are proportionate to the severity and length of the morning sickness, one is scarcely prepared to accept. The gravity of the digestive disturbance is to be estimated by the

amount of nervous irritability, while the difficulties attending parturition may be classified under two heads: maternal and fœtal. The former include uterine inertia, pelvic deformity, and rigidity of the soft parts; the latter, abnormal size of the fœtus and malpositions of the fœtus. Surely no such conclusions are justified, for the reports from the large lying-in hospitals of both America and Europe unmistakably prove no such relation exists. Females who have suffered great annoyance from morning sickness have frequently as easy and sometimes more rapid labors than those who have almost wholly escaped this unpleasant early indication of pregnancy. Therefore, in conclusion, it would appear from a study of this affection: First. That the vomiting of pregnancy is due to a reflex irritation produced by the developing ovum acting upon an exalted nervous system. Second. That it is not an affection of great gravity and need occasion no anxiety or alarm. Third. That active treatment is rarely demanded, as it is only a disturbance of a few weeks at the most. Fourth. That the severity of the gastric trouble is no indication of the character of the subsequent labor. Fifth. That where the affection persists beyond the period of quickening, it is due to pathological causes which must be discovered and treated accordingly.

DISCUSSION.

Dr. Charles P. Noble: Dr. Barker prefaced his remarks by saying that he should not take up the matter from a theoretical standpoint, and that he would not present the theories held by others, but would study it from the standpoint of anatomy. I think, however, that the theory he advances, that the vomiting of pregnancy is reflex in its origin, due to the growth of the ovum, is a very old one. There are a great many theories to account for this affection. Among the most important is that held by Grailly Hewitt—namely, that the vomiting is due to induration or inflammation of the cervix or to flexion. Dr. Hewitt has gone very fully into this subject, and while we may not agree that this is the only cause of vomiting of pregnancy, yet anyone who has studied the large number of cases which he reports cannot help but feel that there is a close relationship between exaggerated flexion of the uterus and also induration of the cervix due to inflammatory trouble and the vomiting of pregnancy. I have myself not infrequently seen this combination. I have also seen vomiting associated with more or less endometritis, and with induration and thickening of the cervix which was present before pregnancy took place. Again, the uterus may be more or less fixed by old inflammatory trouble, and when it becomes pregnant it is prevented from rising into the belly, as is usually the case,

and in that way also the reflexes are increased. Again, we know that the uterus may be retroverted and caught under the promontory of the sacrum, and may then be prevented from rising into the abdomen, and may produce such reflex symptoms. I am satisfied that old inflammatory trouble in the pelvis has a great deal to do with the vomiting of pregnancy. It, however, simply acts to increase the reflexes from the uterus.

A more recent theory, and one supported by so eminent an authority as Kaltenbach, is that the vomiting of pregnancy is hysterical. I think that there is no doubt that a certain number of cases are due to hysteria. But I would not go so far as to hold that all cases are due to this cause.

There is no question that not only do we have as a result of pregnancy changes in the pelvis, but the whole body of the woman increases in size and undergoes changes. The entire vascular system becomes hypertrophied, and the heart also becomes enlarged. We know that pregnancy changes the entire form of the woman. The entire system is involved, and we can readily understand that congestion of the alimentary canal can be brought about. We all know that the nervous system in the pregnant woman is extremely irritable. It resembles the nervous system of children. For this reason, irritation from the pelvis which ordinarily would not be sufficient to cause reflex symptoms, can do so at this period.

The Doctor assumes that the reason why primiparous women are more apt to have vomiting than multiparæ is because the uterus of the multiparous woman is larger, and therefore the growth of the ovum would not cause so much distention. There is no question concerning the fact, but the explanation is not so satisfactory.

It is true that the uterus of the multipara is larger than that of the primipara. It is also true that the abdominal walls are more relaxed, giving a less degree of intra-abdominal and intra-pelvic pressure. The woman is better prepared for a pregnancy, having already been pregnant. The mental condition is probably not so disturbed, and the emotions not so excited in the multipara. All these points must be considered. Moreover, it must not be forgotten that the uterus grows as well as the ovum, so that it is at least questionable whether the ovum distends the uterus. Does it not simply fill it?

It seems to me that the practical outcome of the whole matter is that, given a serious case of vomiting in pregnancy, it is the business of the practitioner to find the cause of the trouble. Whether it is extrinsic purely—due to indigestion or to uræmia; or whether due to excitability of nervous system or to hysteria; or whether some pelvic lesion is the source of irritation. If this plan of treatment were followed, better results would be obtained.

CASE OF INVERSION OF A NON-PUERPERAL UTERUS.

By JOHN B. ROBERTS, M.D.,
PROFESSOR OF SURGERY IN THE WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA.

[Read December 23, 1891.]

THIS case seems to me of interest because of the comparative rarity of the condition. I give it simply as a contribution for clinical discussion.

Mrs. H., aged forty-three, in November, 1890, complained of having had bearing-down pain for some months, and a slight vaginal discharge which had recently become offensive. Menstruation had been regular, and there was no great loss of blood at her usual periods. The woman had been married eight years; had had one miscarriage, but no children.

Vaginal examination revealed a reddish mass protruding from the uterus through a well-dilated os. As this was evidently a submucous fibroid tumor, a drachm of fluid extract of ergot was ordered to be taken three times a day, and douches of corrosive sublimate (1 : 4000) to be used twice daily. A little later the vaginal douche was changed to carbolic acid solution.

About ten days after I first saw her the patient was etherized, and a sloughing, friable mass removed with the fingers and forceps aided by a curette. The mass was about the size of a small orange. The patient recovered promptly and was discharged from treatment in about two weeks' time.

Three weeks later I was sent for to see the same woman, who was then very emaciated, exceedingly weak, and suffering intense pain in the abdomen, with the knees flexed upon the pelvis, and with an exceedingly fetid, profuse, and sanguinolent discharge from the vagina.

Pressing my hand upon the abdomen I found the bladder greatly distended with urine, and upon investigation I discovered that she had not passed any water for several days. Catheterization relieved this condition, and examination by the vagina showed the existence of another sloughing fibroid tumor. This was readily removed with the forceps and fingers. The patient recovered promptly, though she was still weak when last seen.

About three months later she came to my office exceeding pallid, with the statement that for some time she had been suffering from most profuse uterine hemorrhages. Examination revealed protruding from the vulva a mass about the size of a small apple. Constant loss of blood was taking place, and the patient was so anæmic that she nearly fainted in my office, and had to be sent in a carriage to the Polyclinic Hospital. The vagina was packed, and the

patient given full doses of quinine and whiskey. This was in March, 1891. After having been kept in bed for several days she was etherized, and a full examination of the uterine condition made. I found what I had previously suspected—a small growth attached to the fundus of the uterus which had caused inversion of that organ. The mass occupying the vaginal outlet and the vagina was, therefore, the uterus, which had been turned inside-out, with the attached polypoid, fibroid tumor. I readily tore loose from the mucous membrane of the inverted uterus what was found to be two small fibroid tumors, one about the size of a black walnut, and the other rather smaller. They are shown on the plate containing the specimens, but are now shrunken from long immersion in alcohol.

An effort was then made to replace the inverted uterus by continuous pressure made with the finger introduced into the vagina. This was continued for a long time, but proved ineffectual. I considered at the time the propriety of removing the inverted uterus by performing partial or complete vaginal hysterectomy. It seemed to me, however, that it would be wise to make a further attempt at replacement before adopting radical measures. The patient was accordingly kept in bed nearly two weeks in order to build up her general health by stimulus and tonics, before making further attempts at invaginating the inverted uterine walls.

She was then again etherized, and a prolonged effort was made at replacement by means of the fingers and Aveling's repositor. The manipulation was kept up for an hour and a half, but was absolutely useless, although the pressure was made in a very continuous manner. The patient became so weak that I feared she might die upon the table, and I therefore abstained from further manipulation, and again put her back to bed.

Two weeks later another effort was made to overcome the inversion of the womb. I was assisted on this occasion by Drs. Baldy, Baer, and Anna M. Fullerton, whose counsel and aid I felt that I greatly needed. The abdomen was opened by a median incision, when the coils of intestine occupying the pelvis were seen united by recent lymph evidently due to the traumatism of the previous manipulations. An endeavor was made to correct the condition of the uterus by means of strong forceps introduced through the abdomen to dilate the uterine neck, while pressure from below was made with the fingers in the vagina. Although these manipulations were performed by such skilful operators as those I have mentioned, we were unable to make any marked impression upon the displaced organ. Unfortunately I had not provided myself with the most approved form of forceps. I then pushed through the fundus of the uterus a large needle carrying a strong piece of fishing-line to which was attached at the vaginal end a button of soft metal. I hoped that traction on this cord through the abdominal wound would, by means of the button pressing upon the mucous membrane of the uterus in the vagina, cause the uterus to assume its proper condition. While dilatation of the inverted fundus was made by means of the forceps, traction was made upon the string and pressure upward through the vagina. The muscular contraction of the uterine neck, however, prevented anything being gained by this manipulation, although the force applied was such as to finally cause the button to pull through the fundus of the uterus and to make its exit into the pelvis. After spending considerable time in these unsuccessful attempts,

I finally did a partial vaginal hysterectomy, removing the inverted portion high up and stitching the edges of the uterine wall at the fundus together. This procedure was resorted to only after the patient had been under ether for three hours and was so overcome by shock that her condition was extreme. She did not react, her temperature not rising above 95° F., and she died within a few hours.

The abdominal wound was then opened, and a very small amount of blood found near the stump of the uterus. Evidences of non-septic traumatic peritonitis due to the previous manipulation were present, as has been stated in the account of the last operation.

In looking back upon this case, I cannot but feel a sense of regret that the more radical operation of vaginal hysterectomy was not done at the time that the patient was subjected to operation for removal of the tumors causing the inversion. My desire to avoid an operation accompanied by shock and hemorrhage at the time she had been so depressed by violent and repeated flooding, made me adopt what at the time seemed a less radical course. The extreme difficulty of dilating the uterine neck in cases of inversion was not appreciated by me until I found my attempts at replacement futile.

DISCUSSION.

DR. CHARLES P. NOBLE: It has been my experience to see two cases of inversion of the uterus, and in both cases the attempts at reduction failed. The first case I saw at the Lying-in Charity, and was, I think, a long-standing post-puerperal case. Manual reduction was tried but abandoned for the reason that the uterus was soft and macerated. In this case the uterus was amputated and recovery occurred. The second case I saw with Dr. Kelly, and was present at an operation in which he opened the abdomen. The abdominal neck of the inversion was dilated with forceps, and manipulations were made with one hand in the belly and one in the vagina, but the effort at reduction failed. In that case Dr. Kelly took out the whole uterus, and the patient made a good recovery.

Speaking of the treatment, Dr. Roberts did not mention one method which has met with excellent results. It is the method of gradual reduction advised by Dr. Aveling. Constant pressure on the inverted uterus is made through a repositor, which is attached by elastic bands to a support about the waist. A large series of cases has been reported in which this method has been employed with almost universally successful results. Of course, in some cases the presence of adhesions will prevent the reposition of the uterus. The reasons for the success of this plan is plain. The problem is to overcome the resistance of the muscular tissue in the upper part of the cervix, and to make it relax and dilate. This tissue is resistant enough to tire out the mus-

cles of the surgeon when attempting rapid reduction, but gives way before the steady action of the rubber tapes. It seems to me that in a case of any standing, attempts at rapid reduction are inadvisable, and are liable not only to fail but to do harm. It seems to me that in a long-standing case of inversion the thing to do would be to pack the vagina with an astringent tampon, and afterward apply the gradual method of Aveling. If that did not affect reduction, the best thing would be to do a radical operation. The question arises whether it would not be better to remove the ovaries and tubes, which would bring about a cessation of the hemorrhage. This would be a simple matter, and I think that reduction in the size of the uterus would take place. If this were not done, I think that a simple amputation of the protruding mass would be quite a feasible operation, but, of course, the danger there would be that after the mass of the uterus was removed the remainder would re-invert itself, and possibly infect the peritoneal cavity. This could be obviated by using transfixion pins. My own feeling would be in favor of removal of the tubes and ovaries, and later to do a vaginal hysterectomy if necessary.

DR. ROBERTS: In this case the uterus was not soft, but was as hard as a fibroid tumor. The tightness with which the neck grasped the inverted uterus was something astonishing.

I am somewhat familiar with two other cases of inversion of the uterus. One happened some years ago in the country. The practitioner did not know what was protruding after labor, and sent for Dr. Levis, who, after a good deal of manipulation, pushed the inverted uterus back. The second was also, I think, a puerperal case, and happened not long ago at the Woman's Hospital of Philadelphia; in this instance the physician was able, after manipulation for several hours, to replace the uterus. It was perhaps the knowledge of these cases which led me to make such prolonged attempts at reduction. I see now that it was unwise, and I agree with Dr. Noble that if such a case again came under my care, I should be inclined to first remove the ovaries, and if that were not sufficient, to make a total hysterectomy. This patient was *in extremis* at the time, and I did not feel justified in doing a too radical operation when I removed the two small tumors.

APPENDIX.

HIP-JOINT DISEASE AND ITS TREATMENT WITH SOME NEW LATERAL TRACTION SPLINTS.

By A. M. PHELPS, M.D.,
NEW YORK.

[Read by invitation, March 25, 1891.]

The profession of America is somewhat divided upon the subject of the treatment of hip-joint disease, and for the purpose of adding, if possible, a few facts to our knowledge of the subject, I present this paper to-day.

1. I will state that I believe that muscular spasm is always present in morbus coxarius.

2 That spasm of the muscle produces great intra-articular pressure.

3. That the articular pressure produced by the spasm of the muscle is a very serious element in producing the destructive changes that are so frequently and so generally seen in joints untreated or badly managed.

4. I also believe that, so far as possible, *absolute immobilization of an inflamed joint until it is perfectly cured should be insisted upon, and that voluntary or passive motion should be most emphatically prohibited.*

If these ideas are correct, clearly one of the most important steps to be taken in the management of hip disease is to control the spasm of the powerful muscles operating upon the joint by means of extension and fixation applied so as to antagonize the contracting muscles, and put the joint at rest.

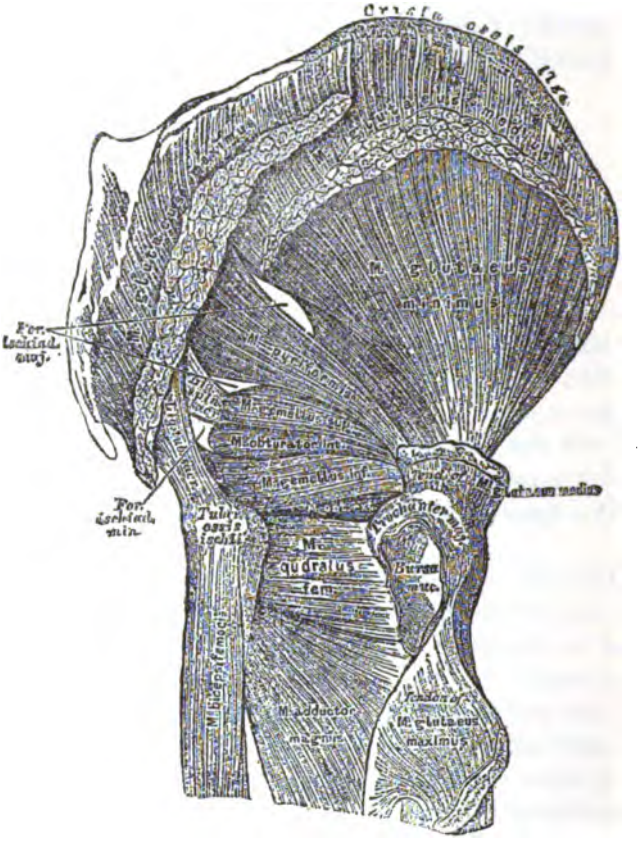
It will be observed in Fig. 1 that the great adductor muscles pass obliquely across the body from the pelvis to the femur.

In Fig. 2 it will be seen that the great glutei muscles, the abductors of the thigh, also pass from the pelvis to the great trochanter obliquely. The rotators take the same direction. These muscles

are affected by spasm in hip-joint disease, and they make traction in the line of the neck and shaft of the femur.

To control the spasm of these muscles and to relieve intra-articular pressure, lateral traction must be made in a line corresponding to the axis of the neck.

FIG. 1.

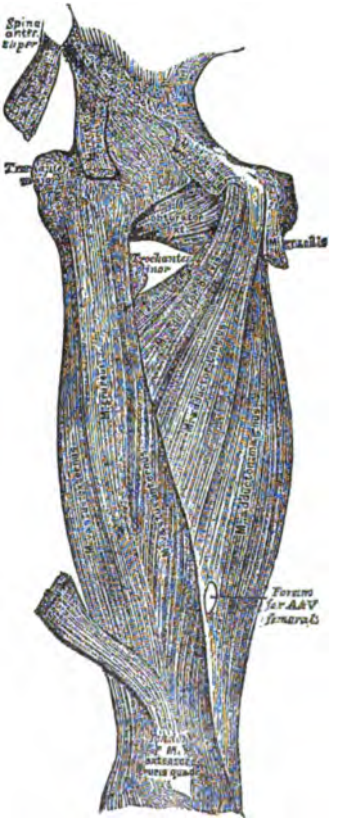


The flexor muscles of the thigh should be controlled by longitudinal traction, and the entire joint fixed. This will be explained later.

How long should the joint be fixed? Until it is perfectly cured. The fear of ankylosis has tended to deter the profession from adopting prolonged fixation of joints inflamed. Hence the devising of the long traction splint which admits of free motion of the joint. It was born of the fear of ankylosis on one hand and the desire to give the patient exercise on the other. It is still extensively used

by eminent members of the profession, notwithstanding those who use it, as many of us have, know that the vast majority of the cases so treated result in ankylosis, shortening, and almost without exception angular deformity. It is not my purpose to denounce the

FIG. 2.



brilliant advance in treatment which marked the advent of the long traction splint over the older methods in vogue at the time of its invention, but only to call attention to its defects, and, if possible, to point the way to other methods which I hope may overcome the errors of the past.

The belief that motion stimulates the inflamed joint to healthy action by increasing the circulation, and also the fear of ankylosis, has led others equally as eminent to employ passive motion throughout the course of the disease.

To determine the question whether prolonged fixation of the healthy joint would result in ankylosis, with Prof. W. Gilman Thompson I performed a series of experiments in the Loomis laboratory upon dogs. Four dogs were selected and their legs immobilized; the joints were examined at the end of the sixth week and at the end of five months. At the end of six weeks one dog had been killed whose leg had been placed in a cramped position, so as to produce great intra-articular pressure. In this case, upon opening the joint a dark-red spot was found upon the head of the bone which corresponded to a similar one in the acetabulum marking the point of contact between the head and the socket.

There was also congestion of the entire head of the bone and the ligamentum teres closely resembling the congestive stage of inflammation.

The synovial membrane was normal; a section was made of the head of the femur, which divided it into halves. Underneath the articular cartilage, and extending to a considerable depth into the head of the bone, the cancellated structure was deeply congested and filled with coagulated blood. The other dogs were killed at the end of three and five months, and the joints were found to be normal.

The conclusions at which we arrived from these experiments were:

1. That a normal joint will not become ankylosed by simply immobilizing for it five months.

2. That motion is not necessary to preserve the normal histological character of a joint.

3. That when a healthy joint becomes ankylosed or its normal histological character changed, it is not due to prolonged rest, but to pathological causes.

4. That immobilizing a joint in such a manner as to produce and continue intra-articular pressure will result in destruction of the head of the bone and socket against which it presses, as is evidenced by the specimen secured in one of the cases.

5. That atrophy of the muscles of the limb will follow prolonged immobilization of the joint.

If these experiments prove that prolonged fixation will not produce ankylosis of a normal joint, that motion is not necessary for the preservation of its normal function, then the causes of ankylosis must depend upon the pathological conditions and not upon prolonged fixation.

It is claimed that motion in the treatment of inflamed joints prevents ankylosis. This must be a mistake, because the statistics of

joints so treated show that ankylosis and deformity to a greater or less extent are by far the most frequent result.

The statistics published by Shaffer and Lovette in the *New York Medical Journal* show in thirty-nine cases finally reported upon in the series:

Ankylosis	19
Slight motion	6
	25
Motion from 10 degrees to 44 degrees	7
Motion to right angle	3
Motion free	3

The three with free motion were treated during the first stage of the disease. Two were under three years old. There were only two cases without shortening.

The splint used was the long traction splint, which admits of free motion at the hip-joint. To test this question still further, I sent a patient whom I had nearly cured, with knee-joint disease, to a distinguished masseur for treatment by that method. I had perfectly fixed her joint for one year. The apparatus was removed and she had motion to about 35 degrees; no pain; could walk with ease. She was daily attended by the masseur. Her leg was flexed and systematically moved and rubbed. After six months I found almost complete ankylosis. A recent examination determined fibrous ankylosis and only a slight degree of motion.

The so-called "ossified man" paid a masseur to move his inflamed joints during two years of his early joint trouble. The result was perfect bony ankylosis of all the joints which were inflamed.

The fakirs of India, after twenty years of penance, holding their limbs in one position, quickly regain the normal use of their joints after their religious frenzy has passed. (Thomas.)

I have several cases of children suffering from joint disease that have been immobilized in a portable bed ten, twelve, and eighteen months, the joints of the lower extremities being kept perfectly quiet during the time. Recent examinations demonstrated that ankylosis had not taken place in the normal joints, while the inflamed joints are freely movable.

I desire to place these cases on record, to stand by the side of the reported cases of ankylosis, supposed to be due to prolonged rest of joint.

In the treatment of wounds, inflamed organs and tissues, rest is

one of the most important surgical laws. The surgeon protects the wound from friction by means of proper dressings, and the ophthalmologist puts the inflamed iris at rest by the use of atropine

FIG. 3.

Taken from the photograph of a child suffering from hip-joint disease, whose joint had been immobilized in a plaster-of-Paris portable bed for sixteen months. The case was perfectly cured with perfect motion, notwithstanding that aspiration of a quantity of pus from the joint was necessary.

in a dark room. Since rest is a surgical law in the treatment of inflamed tissues in other parts of the body, and motion is not necessary for the normal preservation of a joint (nor can it in any way

prevent ankylosis of an inflamed joint), I believe that we should not make an inflamed joint an exception to a well-established surgical law.

The question of ankylosis is determined by the severity, the character, and the duration of the inflammation, the presence of intra-articular pressure, the subsequent cicatricial contraction of soft parts around the joints, the tissues involved, and the amount of destruction of bone and cartilage. Motion of an inflamed joint only interferes with repair, and more certainly hastens on the case to ankylosis and deformity. To prevent this calamity, when it is possible, absolute rest and the relief of intra-articular pressure should be the plan of treatment. Inflamed joints treated upon this plan furnish by far the fewest cases of ankylosis, limited motion, and deformity.

Let us now consider the mechanical treatment. Nearly all cases of hip-joint disease during the period of deformity and the acute and primary stage of the disease, I believe are better treated in bed than elsewhere, for the reason that in bed the joints can be more perfectly immobilized. Here we can apply extension uninterruptedly, and at the same time fix the joint by holding the limb and body in a fixed position. No one would think for a moment of adjusting a walking splint to the fractured limb of a child, or even allow the child to go about on crutches with a splint. Still this practice is almost universally resorted to in hip disease—a disease much more menacing to life and limb than a simple fracture of the femur.

At the Post-Graduate School and Hospital we usually put our patients to bed, varying in time from three weeks to three or four months, until the deformity is entirely overcome and the more active stage of the disease somewhat ameliorated.

Fig. 4, taken from a photograph, shows a patient with the bed dressings adjusted. A long splint is put on the well limb, and the leg and body to the axilla enveloped with a plaster-of-Paris bandage.

Adhesive plasters are applied to the limb; extension and traction are made in the line of the deformity and at right angles to that line. From six to ten pounds longitudinal traction, and from one to three pounds lateral traction are applied for the purpose of overcoming the spasm of the adductor and abductor muscles.

Children under three and a half years of age are treated with a plaster-of-Paris portable bed. (See Figs. 5, 6, and 7). Others are put upon crutches with a high shoe and a lateral traction fixture splint adjusted.

Fig. 4.

Fig. 5.

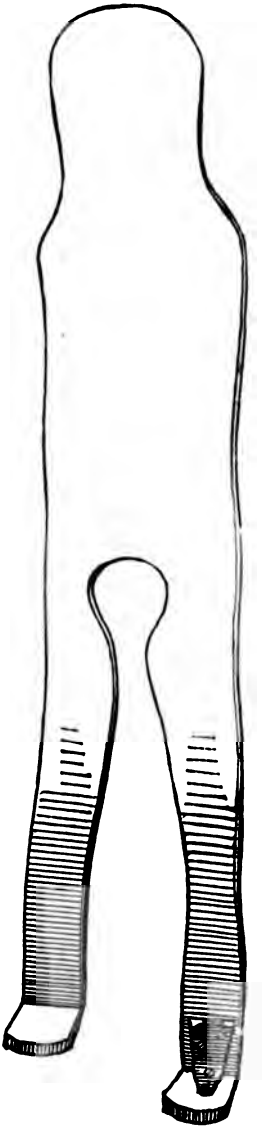
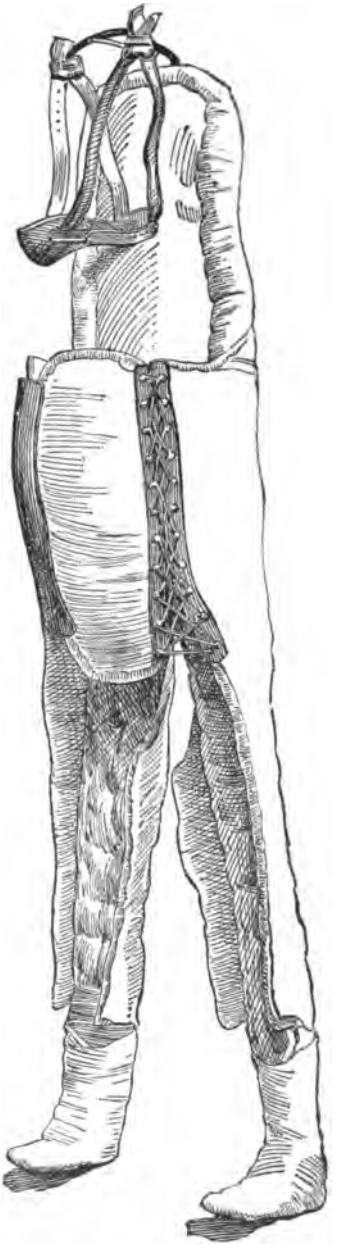


Fig. 6.

Fig. 7.



The bed-treatment, as described, relieves pain, overcomes deformity and the symptoms subside. This suggests the perfection of mechanics. If the principle could be continued, and the patient allowed to exercise, the perfection of mechanical treatment would be attained. To accomplish this I devised the fixation lateral traction splints.

To make the bed, place the child on a piece of paper; mark around him, with the limbs somewhat spread. Put this piece of paper on a board half an inch in thickness, and cut the board to fit the person. Upholster the board with cotton batting, and cover with cotton cloth. A piece of rubber cloth is placed across the portable bed.

FIG. 8.

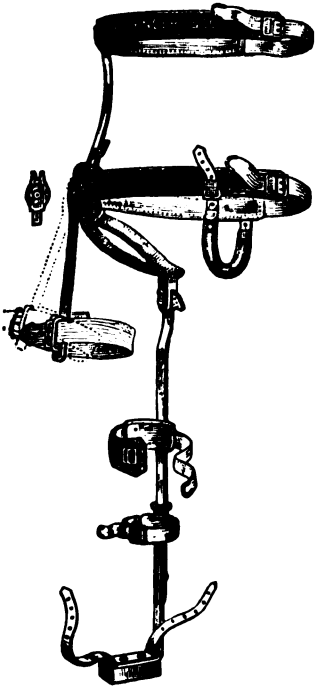


FIG. 9.

The child is laid on the board and enveloped with the plaster-of-Paris bandage from the foot to the axilla to the thickness of half an inch. When the plaster becomes set the front is cut away. The child is now removed; the bed is trimmed by pasting flannel or rubber adhesive plaster over the plaster-of-Paris. Fig. 6 is a correct representation of the bed after it is completed.

The child is placed on this and bandaged in. Extension is made

to the foot-piece of the bed, and lateral traction is made by means of the bandage passed around the leg and tied to the side. Figs. 8, 9, 10, 11, 12, 13, and 14 are photographs of the lateral traction splints, double and single.

The splint extends from the sole of the foot to the axilla, made either with an inside bar (Figs. 8 and 9), or with an outside bar (Fig. 11).

Fig. 10.

Instead of a strap passing around the perineum, a steel ring is substituted, which catches the patient at the tuberosity of the ischium and does not press upon the muscles.

Lateral traction is made in the one splint by means of the lateral traction lever (Figs. 8 and 9), and in the other splint by means of a strap tied to the side bar (Fig. 11); longitudinal traction is made as in the ordinary traction splint, buckling the adhesive strap to the straps at the foot of the splint. This splint immobilizes the

hip-joint, prevents the possibility of angular deformity, and applies traction so as to overcome spasm of the muscles.

The patient is never allowed to step upon this splint.

Splints to immobilize the joint must extend above and below the joint. The long traction splint, stopping at the joint, does not immobilize it and the patient injures the joint by stepping upon it, as

Fig. 11.

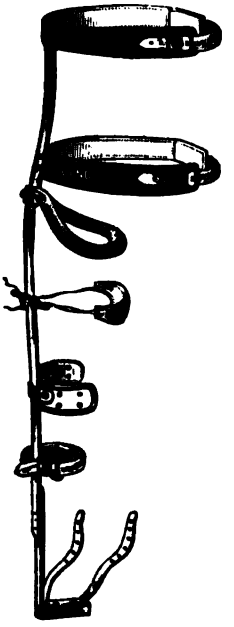
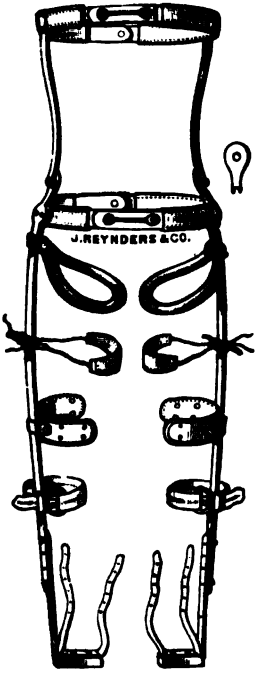


Fig. 12.



is evidenced by the almost constant increase in the deformity, as the splint is worn, in a considerable percentage of all cases.

It has been stated that patients wearing the splint extending up on to the thorax cannot sit down. This is certainly incorrect, as all of these patients can sit on the side of a chair, with the diseased limb hanging over the side, very comfortably.

The crutches are an inconvenience; the long splint passing up on to the body is an inconvenience, but the patient had better submit for a year or two to this slight inconvenience than to go through life with a deformed limb.

The Thomas splint, like the long traction, only tells half the story. He believed that the best result to be attained in hip-joint disease

Fig. 13.

Fig. 14.

was ankylosis. Believing that prolonged rest would result in ankylosis and that fixation of the hip-joint could only be accomplished by grasping the body above and below the joint (which is a fact), he devised the splint which bears his name. This splint extends from the axilla to the calf posteriorly. His patients did recover without angular deformity, but nearly all had shortening, many to a great extent, and abscesses occurred with astonishing frequency.

A large number of cases presented at the British Medical Association by Mr. Sidney Jones, showed that motion was present in nearly every case.

Thomas's splint, not controlling muscular spasm, allows of great intra-articular pressure, resulting in destruction of the joint and the formation of abscesses.

Another serious objection to the Thomas splint is that the patient will step upon the foot. The splint, ending as it does at the calf, protects the limb only so far as the normal movements are concerned. If the splint extended below the foot, and the patient then attempted to step upon it, and if there were a perineal strap, he could not do so much damage to the joint.

My Results.—Cases received before the development of abscesses rarely develop them.

Cases of small abscesses and effusions into the joint are frequently absorbed or heal by primary union after operation.

Cases of discharging sinuses rapidly cease discharging unless there is extensive bone disease.

Many cases recover with perfect motion.

All cases recover with but slight or no angular deformity.

Shortening of the limb does not increase, and cases of ankylosis I seldom see.

To conclude: My observations lead me to believe that one of the most serious elements of destruction in hip-joint disease is the trauma and pressure produced by the spasm of the muscle; that fixation of the joint without extension is an impossibility; that the successful treatment of the joint must depend upon its absolute immobilization, which can only be produced by proper extension and fixation; that the constitutional treatment of hip-joint disease amounts to but little, independent of mechanical treatment; that mechanics is everything; *that extension in the line of the axis of the shaft and deformity alone, in hip-joint disease, is entirely wrong;* that extension should be made *in a line parallel to the axis of the neck*—in other words, *two lines of extension*—otherwise the idea of extension is not per-

fectly carried out; that ankylosis of the joint is not produced by immobilization, but by the severity and character of the inflammation; that the long traction hip-splints in general use neither properly extend nor immobilize the joint; that intra-articular pressure results in the destruction of the joint or ankylosis in a large percentage of cases, is proved by statistics; that the results in hip-joint disease should be as good as those in knee-joint disease, and will be, provided perfect immobilization can be carried out; that patients should never be allowed to step upon any portative apparatus; that a high shoe on the well leg and crutches should be insisted upon until the patient is cured; finally, *that the angular deformity seen in cured cases should not occur, and such cases are a standing rebuke to the splint and methods employed. In other words, no patient with hip-joint disease need ever recover with angular deformity.* In exceptional cases a slight amount of deformity had better be left than resort to osteotomy or extensive myotomy.

DISCUSSION.

DR. O. H. ALLIS: The theory which was held for so long, that motion should be made early, lest ankylosis should occur, and that the proper function of the joint was motion, has been responsible for many bad joints. In my earliest work in orthopædic surgery, following the teachings of that time, I had disastrous results in several cases by breaking up adhesions, and I learned from my own experience that to interfere with a joint at the time when it should have absolute rest, was certainly not in accord with good pathology. I have felt that Nature's best result was fixation. I have never seen the number of cases eventuate in motion as has been given by the reader of the paper. I think, however, that the view of Dr. Phelps, that absolute fixation, even for months, has nothing to do with the ankylosis, is well sustained by experience. In a case of fracture of the thigh we may keep the limb immobilized for two months, and yet there will be no ankylosis. I am sure that much of the trouble we have with the hip-joint is due to the fact that it is moved too abruptly. If we permitted the child to move the joint itself, it would be moved cautiously and gradually. Another of the difficulties in the treatment of hip-joint disease is, that the children have falls. The child gets nearly well and then falls, and the limb is carried to a point beyond what it should be, violent inflammation occurs, and the havoc of the third stage cannot be averted.

DR. DEFOREST WILLARD: I was glad to see the title of this paper, namely, "Hip-joint Disease: Its Management." If there is any disease that requires management, and careful management, it is hip-joint disease. I do not know of a worse element in the treatment of this complaint than the prevalent idea that the application of a splint constitutes the whole treatment. This is only one of the elements. There is no splint that cures hip-joint disease. There is no one method of treatment. There are, however, certain principles that should guide us. I was glad to hear the principle of absolute fixation dwelt on so fully. This combined with extension and other forms of producing rest has given the best results in the treatment of this disease. Dr. Phelps said that he considered rest one of the best measures in the treatment of hip-joint disease. I am sorry that he did not go further, and say that it far exceeded all others; that it was beyond all others. It is this idea that should enter into all of our management of this class of cases.

Extension is simply one of the means of producing rest. It is wisely applied in the line of deformity, and when there is great intra-articular pressure, by endeavoring to overcome the spasm of the muscles. By horizontal extension we relieve a large portion of the pressure, and by the application of lateral extension we have an additional means of overcoming the spasm. I do not believe that extension actually separates the femur from the acetabulum, but it modifies the contact and lessens the destructive changes occurring in the joint. We must employ this principle of rest, and for this we require both fixation and extension.

In regard to the application of apparatus. We cannot fix any portion of the body by allowing the splint to end at that portion. A splint that ends just

above the hip-joint does not fix that joint. The apparatus must embrace the thorax. While we do not get absolute fixation even by the longest splint, we approach it as nearly as possible. The patient should not be allowed to walk upon the apparatus, no matter what form is used. We should use crutches until all inflammatory action has ceased, even if that should take years. These cases are best treated in bed during the painful stage. If they are permitted to move about, we are apt to have direful results. They will run and jump on their apparatus and on their crutches. They will play ball, and then a sudden traumatism awakens all the old inflammation into new life, and destructive changes rapidly follow. The great secret of the posterior bar splint as applied by Thomas was, that he locked up the patient and kept him locked in it for months or years without permitting a single attempt at motion, day or night.

DR. JAMES K. YOUNG: I do not think that Dr. Phelps sufficiently emphasized the value of traction. I was brought up in the school of traction. I have had excellent results from the Taylor-Pavis splint, although it does not fix the body. In one case, in a girl aged eleven years, where the disease had entered the second stage and excision had been proposed by an eminent surgeon, a perfect cure with complete motion was obtained under the use of this splint. Traction in the line of deformity tends to fix the joint.

The only other point to which I would refer is in regard to the treatment of cases that are doing badly—that are becoming deformed. Deformity represents the fact that the treatment is not successful. Where deformity is progressing, the case should be treated by rest in bed. This usually overcomes the difficulty, and the case, as a rule, goes on speedily to a cure.

DR. G. G. DAVIS: While I do not believe that extension in the line of the limb is the most efficient means of relieving intra-articular pressure, still experience has shown that it is efficient in relieving the pain and other symptoms arising from this pressure. Owing to the shape of the lower portion of the acetabulum which forms an inclined plane, as the femur is drawn downward the head is forced outward.

The splint of Blanchard, of Chicago, which is a modification of that of Thomas, carries out the idea of Dr. Phelps, inasmuch as it is provided with an elastic band encircling the thigh, making traction outward, the weight of the splint pulling downward.

DR. PHELPS: I fully agree with Dr. Willard that rest is the first principle —the corner-stone on which we base our treatment. Ordinary extension relieves the symptoms by overcoming the action of the iliacus internus and other muscles. It is, however, just as essential to overcome the spasm of the adductor and abductor muscles. In order to fix the joint, the splint must extend to the thorax. The patient should not be allowed to step upon the apparatus. Traction does not fix the joint. The experiments of Lovett and Bradford showed that even with a weight of twenty to thirty pounds the leg could be flexed to an angle of thirty-five degrees. Traction in the line of the limb does lessen the articular pressure to a certain extent, but not sufficiently, for it does not overcome the spasm of the abductors and adductors.

I am somewhat familiar with the Blanchard splint, although I have not used it. It is constructed upon the right principles, and it may accomplish the desired end. It is somewhat complicated. The lateral traction fixation splint, presented this evening, is simple and cheap in construction.

EXHIBITION OF APPARATUS.

DR. JAMES K. YOUNG exhibited

PORTABLE BEDS USED IN THE TREATMENT OF HIP-JOINT DISEASE.

These beds consist of a frame of iron over which canvas is stretched, the covering being in three sections, the centre one so attached that it can be readily removed. A rod and wheel is attached to one extremity for extension. By the use of this device the patient can be carried up and down stairs or into the open air whenever desired.

DR. DEFOREST WILLARD exhibited

BEELY'S APPARATUS FOR THE TREATMENT OF LATERAL CURVATURE.

The frame here exhibited is for the treatment of lateral curvature by the use of heavy weights upon the projecting portions of the rotated trunk; it is the one employed by Beely, of Berlin, and is a modification of Fischer's.

It consists, as you see, of a wooden frame with four uprights and adjustable lateral bars, with adjustable hip and shoulder pads. In appearance it resembles a stall for a restive horse.

The patient flexes his body at the hips until the back is in a horizontal position and his elbows rest upon the platform constructed for this purpose. The shoulders and hips are then firmly fixed in position by clamps. A broad strap, three inches in width, is then placed across the body and attached to the framework on the left side, so that it passes over the prominent portion of the thorax opposite the dorsal convexity. This strap is weighted with from thirty to sixty pounds, attached to hooks at its end. Another strap attached to the right side of the frame passes in the opposite direction across the lumbar rotation when the convexity of the curve is to the left, and is then weighted in a similar manner.

By these two forces passing in opposite directions an untwisting force is applied to the distorted trunk, and in connection with manipulations and gymnastics is very serviceable in unwinding the bodies from their rotated positions.

The patient remains in this position as long as he is able to do so without fatigue, and the method can be repeated several times a week, or daily, as circumstances may offer.

DR. DEFOREST WILLARD also exhibited

BEELY'S SCOLIOMETER.

The scoliometer which I present to you this evening was devised by Dr. Beely, of Berlin, for making a record of the outline of the trunk in lateral curvature. It is composed, as you see, of a number of steel rods lying side by side. The frame is constructed so that each individual rod can be moved easily upon its fellow. The arrangement is such that when the blunt points of these rods are pressed against the back they adapt themselves to the inequalities of the trunk, and give a record, every one-twelfth of an inch, of the irregular formation.

The framework of these rods is so constructed that after the outline map has been taken, they can be fixed by a clamp firmly in their position, and by means of small pins upon their under surfaces the record can be transferred to paper by stamping. The minute punctures can then be made more evident by marking them with pencil or ink. The method is somewhat similar to that employed by hatmakers in securing the outline of a head. A spirit-level is attached to this instrument so as to be certain that the record is taken in a perfectly straight line, thus insuring greater accuracy.

The rods are made square so that they slide smoothly upon each other. The instrument, although heavy, is superior to one made of wooden rods, since the latter warp, and the sliding motion is thus interfered with.

A plummet-line is attached to a graduated tape and suspended by buckling about the neck. Distances of say two inches are marked off upon the skin of the back with a blue pencil. A systematic custom should be pursued with reference to these distances, so that each record may be always at the same points.

As many tracings may be taken as is desirable. The patient is laid upon her face upon a hard table, or she may remain standing firmly. The central pin or spinal pin is fixed in such a position that the instrument will sink to a point that will give a record of the median lateral line of the body. Tracings are then taken from all the points marked, and by connecting the extremities of the outlines a perfect contour of the body is secured, which can be filed away for reference and for comparison with future tracings. These tracings should be taken at least every three months.

The instrument is necessarily expensive; but, as I have already said, it cannot be made of such a cheap substance as wood without interfering with its usefulness.

As an instrument of precision it is valuable, since it is difficult to be certain by simply making a record with the eye, or by photographs, as to the advance being made by gymnastics and other methods for relieving lateral curvature.

DR. A. M. PHELPS: I think that the rotation is one of the most difficult deformities to treat. We can only arrest, but cannot cure it.

I am somewhat familiar with the apparatus for measuring the amount of deformity. I am also familiar with Zander's scoliometer. He believes that it is impossible to take an accurate measure of the spine unless the patient is fastened in the machine. Even with that, it is impossible to secure two measurements exactly alike. I have seen with the Zander machine great differences in measurements taken within a few minutes of each other. By taking two or three measurements in the course of half an hour, and then repeating them in the course of six months, we obtain an approximate idea of the change in the deformity, but it is not accurate.

DR. GEORGE E. SHOEMAKER: In the case of children, one source of inaccuracy in the measurements obtained by the apparatus shown by Dr. Willard will be found in the fact that the outlines are taken at levels measured in inches from the neck and not at levels marked by spinous processes. As the spine increases in length in the course of months, there would be a difference

on that account in the location of the curvature as recorded by this instrument. This objection does not hold where the patient is full grown.

DR. W. H. H. GITHENS: A boy about twelve years of age, having a decided lateral curvature of the spine, fractured his clavicle. The fracture was on the concave side of the curvature. I treated the injury by means of FOX's apparatus, and when it was healed the curvature had disappeared.

DR. JAMES K. YOUNG: I have obtained the best results in the treatment of these cases by means of the Swedish movement cure, as employed by graduates of the Central Institute of Stockholm, Sweden. This condition may be divided into three stages: First, that in which the curve can be altogether removed by extension; second, that in which improvement can be made upon the curve by extension, but where it cannot be entirely removed; and, third, that in which the deformity is not affected by any extension. In the first and part of the second stage these cases are greatly benefited by physical treatment.

INDEX.

ABDOMINAL surgery at the Kensington Hospital for Women, 140
tumors, interesting cases of, 312
Abortion at five weeks, with examination of embryo, 217
Albuminuria of pregnancy, two cases of, 158
Address of retiring president, 1
Allen, Harrison, 20, 41, 39
Allen, Mary E., 348
Allis, Oscar H., 194, 206, 451
Angney, William M., 169
Appendicitis, four operations for, 281
medical treatment of, 392
report of cases, 270
the operative treatment of, 261
Appendix, 435
Arterio-capillary fibrosis, 116
Ashton, William E., 95, 206, 318
Aulde, John, 236, 240

BAER, B. F., 317, 406
Baldy, J. M., 77, 96, 124, 172, 207, 291, 401, 407
Barker, T. Ridgway, 217, 424
Beef preparations, nutritive value of, 173
Beely's apparatus for lateral curvature, 453
scoliometer, 453
Bladder, examination of, with electric-light cystoscope, 331
Bowel, obstruction of, 298
Brain, penetrating wound of base, 365
surgery, clinical contribution to, 369
Brill, Mr., 239
Bryant, Mr. Thomas, 289
Buckby, Wilson, 321

CATARACT, simple extraction of, 324
Chittenden, R. H., 173, 188
Cohen, J. Solis-, 170
Cohen, S. Solis-, 17, 121, 123, 186, 214, 215, 239
Collins, James, 41, 190, 226, 240, 320, 390
Colon, tumor of, specimen exhibited, 123
Colotomy, lumbar *versus* iliac, 97
Corneal ulcers, treatment by actual cautery, 43
Councilman, William T., 4, 18
Cystitis, medical treatment of, 341
Cystotomy, supra-pubic, 358

DA COSTA, John C., 156, 256, 311
Davis, E. P., 138
Davis, G. G., 452
Deaver, John B., 97, 105, 115, 130, 136, 156, 331, 341, 362
De Schweinitz, G. E., 43, 49, 72, 421
Donelly, John F., 348
Downes, A. J., 94, 158

ESHNER, Augustus A., 116
Exophthalmus, traumatic, 107

FIBROID tumor, specimen exhibited, 124
Flick, L. F., 17, 161, 171, 215
Formad, Henry F., 16
Fractures and injuries of the spine, 408
Fullerton, Anna M., 115

GALL-STONES, sweet oil in treatment of, 249
Gibbes, Heneage, 168, 171, 172
Gould, George M., 63
Griffith, J. P. Crozer, 15, 24, 40
Gunshot wound, with use of electric probe, 308

"HAIRY tongue," microscopical specimen exhibited, 123
Hare, H. A., 294
Hewson, A., 194
Hip-joint disease and its treatment by some new lateral traction splints, 435

Hip-joint, excision of, specimen exhibited, 124
Hirsh, A. B., 259
Hoffman, Joseph E., 94, 105, 138, 156, 196, 208, 295, 318, 347, 357, 358, 364, 389
Hovent, Dr., 209
Hulshizer, A. H., 363
Humerus, case of exostosis of, simulating axillary dislocation, 195

INHALER, modified Junker, for ether and chloroform, 388
Instrument for making application to uterine and urethral canal, 310
Inversion of non-puerperal uterus, case of, 430

JACKSON, Edward, 48, 63, 246, 324, 330

KEEN, W. W., 1, 92, 113, 123, 191, 194, 281, 288
Keyser, P. D., 329
Kirkbride, M. F., 294'
Kirkpatrick, A. B., 308, 310, 400

LABYRINTHINE disease, pilocarpine in, 228
Laplace, E., 120, 166, 171, 172, 318, 365, 387
Leidy, Joseph, Jr., 73, 390
Lloyd, J. Hendrie, 132, 139, 386, 413
Longaker, Daniel, 348, 357
Lung, syphilis of, 4

MASSEY, G. Betton, 205, 363, 405
Mays, Thomas J., 33, 41, 186, 214, 216, 227, 249, 259
Miller, John S., 110, 193
Morrison, W. H., 50
Morton, T. S. K., 261, 296, 347, 385, 391, 399
Musser, J. H., 170
Mydriatics, how to use, 241
Mills, Charles K., 386

NEPHRORRHAPHY for floating kidney, 110
Nitrogen-containing foods and their relations to morbid states, 181
Noble, Charles P., 140, 156, 311, 319, 347, 356, 399, 406, 423, 428, 432

OPHTHALMIA neonatorum, 415
Ophthalmoscope for general use, an, 246

PACKARD, Fred. A., 64
Packard, John H., 104
Pambotano, anti-malarial properties of, 221
Parish, W. H., 349, 357
Pepper, William, 287
Petrolatum, 236
Phelps, A. M., 435, 452
Phthisis, climatic treatment of, 24
nervous system in treatment of, 33
treatment of upper air-passages in, 20
Pneumo-therapeutic Institute of Brussels, the, 209
Portable beds in hip-joint disease, 453
Price, Joseph, 206, 270, 297, 306
Price, M., 126, 131, 205, 257, 295, 298, 312, 322, 356, 363, 385
Puerperal eclampsia, treatment of severe, 50

RANDALL, B. Alexander, 121
Relation of imperfect surgery to sequelæ of pelvic and abdominal operations, 196
Risley, Samuel D., 48
Roberts, John B., 15, 114, 115, 195, 321, 363, 369, 387, 390, 430, 433
Robinson, James, 240
Roussel, A. E., 221, 227

SARCOMATA, multiple, in a child, 64
Scapula, fracture of body of, through muscular action, 73
Scarlatina, surgical, 132
Schneideman, T. B., 245, 415
Shimwell, B. T., 93
Shoemaker, George E., 347
Slocum, H. A., 340, 346
Smith, S. MacCuen, 228
Spectacle-frames, construction and adaptation of, 56
Stelwagon, H. W., 136
Stewart, William S., 54, 256, 399
Subclavian artery, new method of compressing, 191
Supra-vaginal hysterectomy, 401
Surgical cases, 126

THOMAS, Charles Hermon, 48, 56, 63, 422
Tuberculosis, some new points in treatment of, 161
Tyson, James, 171, 341, 348

URETHRA, bladder, and ureters during pregnancy, etc., 349
Uterus, multiple tumors of, specimens exhibited, 172

VOMITING of pregnancy, some mooted points in the, 424

WALKER, J. B., 186, 258
Waugh, William F., 240
Welch, William, 55, 138
Werner, Marie B., 320, 391
Wharton, H. R., 105
Willard, DeForest, 115, 124, 139, 294, 408, 453
Wilson, James C., 215
Wilson, Reynolds, 54
Wood, H. C., 185, 189
Woodbury, F., 181, 187, 189, 292, 318

YOUNG, James K., 452, 453

28